PLANNING FOR DISASTER RECOVERY: LESSONS FROM HURRICANE IKE FOR THEORY AND PRACTICE

A Dissertation

by

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ABSTRACT

Recovery is the least researched and prepared-for phase in the disaster management cycle, but the critique of the post-Katrina's planning has begun to get researchers' attention with an emerging consensus on the value of recovery planning and its timing. My dissertation focuses on improving recovery planning by asking "how can the recovery planning process and outcomes following Hurricane Ike in Galveston, Texas inform theories of recovery planning?" This inquiry is addressed in three articles.

The first article is an integrative review of the recovery planning literature, theories of planning and plan quality to lay out evaluation criteria. Recovery planning should be proactive, driven by local leadership, long-term and broad scope based on accurate data. Success of a recovery plan depends on setting transformative and restorative goals, alternative plausible futures and flexible policies. While federal recovery programs use several of these principles, they are criticized for short time frame, project-oriented and a prescriptive approach.

The second article undertakes a qualitative analysis of recovery planning in Galveston. Resistance to start planning early reflected a lack of capacity. Hence, when planning started, it was based on limited fact-basis and expertise. The planning process was open and transparent, yet not adequately representative; and deliberation on important issues fell short. The result was a list of projects, not a plan, which failed to gain political and legal approval.

The third study is an assessment of population, economic, and housing recovery. Population of Galveston is slowly restoring its pre-Ike level, but I found disparities among neighborhoods and race/ethnic sub-populations. Changes in shares of industries from job market and composition of jobs show that Ike was an interruption and acceleration to longer and broader trends in the local economy. Recovery of housing has either failed or been severely thwarted at the aggregate level. At the disaggregate level, the lag is even larger for damaged duplexes and multifamily units.

Finally, I synthesize the findings of the three studies and suggest lessons for recovery planning practice and questions for future research to further inform our knowledge of the opportunities and challenges in disaster recovery planning.

DEDICATION

For maman and baba

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TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION

Recovery is the least researched and prepared for phase in the disaster cycle (mitigation, preparedness, response, and recovery) (Blanco et al., 2009; Leonard & Howitt, 2010; Olshansky, 2005a; Olshansky & Chang, 2009; Peacock, Zhang, & Dash, 2006; Zhang & Peacock, 2010). Furthermore, long-term recovery planning, particularly by localities, has received even less attention. However the widespread critique of the post-Katrina's planning process has recently begun to get disaster researchers' attention. This dissertation will focus of this neglected area of long-term disaster recovery.

The overarching question of this dissertation is "how can recovery planning processes and the nature of long-term recovery following hurricane Ike in Galveston inform theories of community planning processes in general and recovery planning in particular to improve recovery processes?" This inquiry will be addressed in three articles with more specific questions. The first paper will engage in an integrative literature review examining theories of community planning, the newly emerging literature on post-disaster recovery planning, Federal guidelines for post-disaster planning, and the general literature on community recovery asking two primary questions: 1) what are the unique features of post-disaster recovery planning that present challenges and important considerations for planning theory and 2) what can planning theories offer to improve post-disaster recovery planning from how it has occurred according to the literature and guidelines specified by the United States Disaster

Assistance Framework developed by the Federal Emergency Management Agency (FEMA)? The second article will undertake a qualitative case study analysis of the post-Ike recovery planning process in Galveston, Texas to answer the questions: how did Galveston's post-Ike recovery planning process unfold, what strengths and weaknesses emerged during that process, and does this case inform still further the issues that emerged in the first paper. The third paper will engage in a quantitative analysis and assessment of recovery at the community level, examining important dimensions of the community including its population, economy, businesses, and housing. The key question to be addressed is how can we characterize Galveston's long-term recovery after Hurricane Ike?

Literature Review

Disasters are significant events which imply major harm and losses for those who are exposed to them. The United Nations International Strategy for Disaster Risk Reduction (UNISDR, 2004: 17) defines a disaster as "a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses which exceed the ability of the affected community or society to cope using its own resources". Recovery from such events is defined by Smith and Wenger (2007:23) as "the differential process of restoring, rebuilding, and reshaping the physical, social, economic, and natural environment."

Multiple studies have found disparities in disaster impacts as well as recovery outcomes shaped by pre-impact conditions including physical vulnerability, hazard exposure (Highfield, Peacock, & Van Zandt, 2010, 2014) and socioeconomic factors

frequently referred to as social vulnerability (Cutter, Schumann, & Emrich, 2014; Dash, Peacock, & Morrow, 1997; Zahran, Brody, Peacock, Vedlitz, & Grover, 2008; Zhang & Peacock, 2010). Social vulnerability considers the socioeconomic characteristics of the households that will impact their ability to prepare for, anticipate, cope with, and recover from hazard events (Blaikie, Cannon, Davis, & Wisner, 1994). Social vulnerability indicators such as poverty, race/ethnicity, age, gender, household composition, and housing tenure are found to explain the variability in household capacity for both mitigation and recovery (Cutter, 1996; Cutter, Boruff, & Shirley, 2003; Highfield et al., 2014; Van Zandt et al., 2012) as well as damage and response (Van Zandt et al., 2012). Social vulnerability factors influence success or failure and also rates of recovery through various mechanisms (mediators) including access to assistance or resources for recovery, mobility, and access to decision making procedures.

In the disaster literature housing recovery has been thought of as a key component of community recovery and is shown to be very inequitable. Recovery of housing in the US is largely a market-driven process (Peacock et al., 2006; Zhang & Peacock, 2010) which often tends to reestablish inequitable pre-disaster development patterns and sometimes fail to reduce preexisting (physical and social) vulnerabilities to disasters. Inequalities emerge from what is initially perceived as a common community of suffering and further exacerbate by the gains and profit from tragedy(Alesch, Arendt, & Holly, 2009). Disasters do not affect everybody equally. Peacock et al. (2007) point to the unequal nature of damage among households as one of the most consistent findings in the disaster literature: low-income and minority households tend to suffer

disproportionately higher levels of damage in disasters (Bates, 1982; Bates & Peacock, 1989; Blaikie et al., 1994; Bolin, 1982, 1993; Bolin & Bolton, 1986; Dash et al., 1997; Drabek & Key, 1984; Haas, Kates, & Bowden, 1977; Peacock & Girard, 1997; Quarantelli, 1982).

Inequitable patterns of damage can set the stage for very different recovery trajectories for minority, and particularly predominantly Black neighborhoods when compared to Anglo neighborhoods (Highfield et al., 2014). While receiving higher levels of damage, these households have limited access to both private and public resources important for permanent housing recovery due to various discriminatory factors such as poor language skills and educational backgrounds, lack of mobility, weak capability to repay Small Businesses Administration (SBA) low interest loans which is the primary governmental program for the uninsured and underinsured households (Berke, Kartez, & Wenger, 1993; Bolin, 1982, 1985; Bolin & Bolton, 1983; Bolin & Bolton, 1986; Bolin & Stanford, 1991; Dash et al., 1997; Morrow, 1997; Phillips, 1993; Rubin, Saperstein, & Barbee, 1985).

Racial and ethnic populations and the poor in the US are consistently found to be more vulnerable to natural disasters, due to factors such as language, housing patterns, building construction, community isolation, cultural insensitivities, and social exclusion (Fothergill, Maestas, & Darlington, 1999; Fothergill & Peek, 2004). Marginalized racial/ethnic groups are often excluded from community post-disaster planning and recovery activities (Bolin & Bolton, 1983; Morrow, 1997; Morrow & Peacock, 1997;

Phillips, 1993; Quarantelli, Abetz, & Dynes, 1985) and may be taken advantage of by private businesses.

The connection between aspects of hazard assessment, particularly social vulnerability, and differential recovery trajectories emphasizes the need for planning to reduce inequalities in recovery. Nonetheless, very little is known about how post-disaster recovery planning processes or improvised recovery (Lindell, Prater, & Perry, 2007), shape or lead to inequalities. My qualitative case study on post-Ike recovery planning process in Galveston will explore this issue.

Recovery is portrayed as an uncertain, conflict-laden process bounded by time constraints and a wide range of stakeholders, interests and funding sources involved; hence its outcomes are strongly influenced by decision making and institutional capacities (Berke et al., 1993; Bolin, 1993; Bolin & Bolton, 1983; Mileti, 1999; Peacock & Ragsdale, 1997; Rubin & Popkin, 1990). Previous studies have reported complexities and high level of uncertainty in post disaster situations where no single person or organization is in charge, and there would be no simple solutions (Johnson & Hayashi, 2012; Oliver-Smith, 1990; Olshansky, Hopkins, Chandrasekhar, & Iuchi, 2009; Olshansky & Johnson, 2010; Peacock & Ragsdale, 1997) From the sociopolitical ecology perspective, any outcome in the recovery process would emerge out of the interplay of mutual contingencies, competing interests, and coalitions exercised through a variety of structural linkages(Bates & Peacock, 1989; Peacock & Ragsdale, 1997).

Disasters have long-term impacts on community conflicts and cohesion in many different ways (Bates & Peacock, 1989; Carroll, Paveglio, Jakes, & Higgins, 2011;

Morrow & Peacock, 1997). Disagreements on possible changes in the post-disaster window of opportunity are found to be one of the sources of conflict. A multitude of new suggestions and ideas usually emerge after a disaster. Some have resulted in new ways of thinking about communities, enhancing mitigation, and increasing community involvement, while others reduced involvement, created dependency and increased future vulnerability (Dash et al., 1997). Value orientations shape whether post-disaster opportunities are seized upon for the betterment of community such as improved efficiency, equity or amenities (Berke et al., 1993; Bolin & Stanford, 1998; Olshansky, Johnson, & Topping, 2006). The political systems of impacted societies might themselves undergo formal and informal changes after a disaster due to emergence of new priorities and policy changes that gain support from segments of the community or as a result of the mistrust and blame toward authorities associated with the disaster itself or the recovery process. There can also be reactions by powerful forces, thwarting potential changes (Bates & Peacock, 1989; Morrow & Peacock, 1997; Olson, 2000).

There is a general consensus among disaster researchers on the value of planning for disaster recovery and its timing as a critical factor (Burby et al., 1999; Johnson & Hayashi, 2012; Leonard & Howitt, 2010; Olshansky & Chang, 2009; Olshansky, Johnson, Horne, & Nee, 2008; Olshansky et al., 2006). Communities need to plan in order to deal with situations that include multiple stakeholders, agencies and organizations inside and outside the disaster-hit community, conflicts of interests and limited resources to fulfill long lists of priorities (Smith & Birkland, 2012). However

recovery planning is found to be associated with a number of challenges as well as opportunities that make it distinct from normal-time planning processes.

Recovery processes should be designed with the dynamic and evolving nature of communities as complex systems in mind. In a post-disaster situation, normal community dynamics are disrupted by the event and yet chronic social vulnerability issues are often exposed. Nevertheless, rather than looking to the future, the disaster recovery process is typically focused on a return to normalcy. Setting such direction for recovery is a result of ignoring what many studies have shown, recovery is never a return to the status quo ex ante, or the conditions as they were before the event; because the effects of disasters on communities are complex and long-lasting (Johnson & Hayashi, 2012). While there is a growing literature suggesting that planning is critical for the success of long-term recovery (Olshansky, 2005a; Olshansky & Chang, 2009; Olshansky et al., 2009; Olshansky et al., 2008), there has been little focus on how planning actually works under the unique circumstances of each disaster and affected localities (Olshansky & Johnson, 2010). We need more detailed examinations of how the complexities and conflicts often associated with post-disaster situations play into recovery planning processes and influence their outcomes.

Disaster, according to Olshansky et al. (2012) is an extreme, time compressed case of the normal process of capital depletion and replacement. One of the challenges related to time compression is that decision-making for recovery must occur at a faster pace than the information and knowledge necessary for planning generally flows (Johnson & Hayashi, 2012; Olshansky, Hopkins, & Johnson, 2012). Disasters often

present opportunities to make rapid physical and social changes to a community through redevelopment employing an influx of disaster-related resources. Ideally, a community should strive to fully coordinate available assistance and funding while seeking ways to accomplish other community goals and priorities, using the disaster recovery process as the catalyst (Spangle, 1986). However in practice, creating a balance between quality versus speed and short-term versus long-term needs is challenging (Burby et al., 1999; Olshansky, 2005a; Olshansky et al., 2006). We need a better understanding of how these conflicting priorities play out in the planning and decision making process as well as how localities decide and plan for creating a new normal while seizing the opportunities for long lasting changes.

Purpose

The overarching purpose of this study is to improve recovery-planning practice and inform recovery-planning theory through the experience of Galveston after hurricane Ike. My approach is novel in the sense that I will combine quantitative description and analysis of recovery patterns with a qualitative account of recovery planning. The important aspects of recovery, including complexities, conflicts and contentions, opportunities, time compression, inequalities and disparities and delays will be linked thorough a mixed method approach. This study seeks to examine how recovery planning can influence the nature of recovery processes based on the experience of Galveston. Most studies do one of the two things; they either provide a qualitative account of recovery planning and process (Olshansky & Johnson, 2010); or measure the recovery outcomes in terms of various dimensions such as gains or losses in population,

employment, sales or housing. In this series of articles I will link the quantitative assessments of recovery with a qualitative understanding of recovery planning seeking to examine how conflicts, compression, and opportunities played out in the recovery planning process. This study will have the following contributions:

- Informing study of disaster recovery planning with planning theory
- Informing planning theory with insights from post-disaster recovery as a especial planning situation
- Measuring recovery of Galveston from Hurricane Ike
- Informing recovery planning with lessons from Galveston

Structure of the Dissertation

I will first review the emerging literature on post-disaster recovery planning to lay out how one would evaluate a good recovery planning process and what issues should be addressed in the recovery plan (process and content). Next, I will review the theories of planning and evaluate their application in the unique post-disaster situation. This review will provide ideas about how to engage in recovery planning, and what content to address and include in the recovery plan. This framework of an ideal process and content for recovery planning will be used then to evaluate FEMA's programs and guidelines for recovery planning. The second study, my qualitative case study of planning process in Galveston, provides an actual case to examine the strengths and weaknesses of planning process and content according to theoretical perspectives of recovery planning. It will also test the ideas for successful recovery planning and can reveal new issues in the Federal recovery planning guidelines and procedures. The third

study is a quantitative assessment of community recovery in different dimensions. Findings of these three independent but related studies will be synthesized in a conclusion article. I will speculate about the impact of planning process and content in Galveston (from the second study) on recovery outcomes in various dimensions (from the third study). The story of planning and recovery processes from Galveston's experience, will offer new understanding of the challenges of post-disaster recovery planning and new insights that perhaps will better insure resilience as a long-term outcome.

CHAPTER II

1ST ARTICLE: THEORETICAL PERSPECTIVES THAT INFORM DISASTER RECOVERY PLANNING

Introduction

Disasters are significant events which imply major harm and losses for those exposed to them. The United Nations International Strategy for Disaster Risk Reduction (UNISDR, 2004: 17) defines a disaster as "a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses which exceed the ability of the affected community or society to cope using its own resources". In the late 1970s, the National Governor's Association (1978) designed a four phase model known as the process of comprehensive emergency management to organize the activities of emergency managers. The process of comprehensive emergency management can be understood as a cycle metaphor with four consequent but overlapping phases including mitigation and preparedness before the disaster, and response and recovery (also restoration and reconstruction) after the disaster.

The recovery phase of the emergency management cycle deals with the tasks of restoring, rebuilding, and reshaping the physical, social, economic, and natural environment over a long time span following the disaster. The goals of recovery are rebuilding the damaged structures and facilities effectively and efficiently, making sure to rebuild in a safer, more resilient, and sustainable way, as well as rebuilding or

restoring the infrastructure and public services and amenities. Recovery from a disaster presents both unique challenges and opportunities to communities to address some of their pre-existing problems, seek new changes that would not be possible otherwise, and improve their disaster resilience. Through planning, communities can tackle their recovery challenges and seize the recovery opportunities. Planning, in general, involves crafting a consensus-based vision, setting goals, translate them to objectives, and proposing ways (strategies, policies and actions) to reach those objectives. To succeed in recovery through planning, communities need a set of evaluation criteria for recovery planning, derived from a guiding theory of recovery planning. This article aims at identifying the success criteria for recovery planning process and recovery plan as its product, in order to contribute to a guiding theory of recovery planning. A guiding theory of recovery planning should be drawn from theories of planning and take into consideration the unique challenges and opportunities posed by disasters during recovery.

Some of the challenges and opportunities associated with disaster recovery are known through previous research. Disaster experts in sociology, planning, political science, anthropology, and similar fields have studied recovery processes, particularly in the form of case studies, since 1970s from various perspectives. Nevertheless, recovery remains the least studied and prepared for phase in the emergency management cycle. This lack of attention has lowered the capacity of communities in preparing for disaster recovery. While the widespread critique of the post-Katrina planning processes has recently begun to get disaster researchers' attention, long-term recovery planning has

received very little attention from local governments (Berke, Cooper, Aminto, Grabich, & Horney, 2014). Providing clear guiding criteria to local governments can encourage and help them to plan for disaster recovery.

There are some disagreements among researchers about the value of planning for recovery. While most researchers agree on the benefits of planning for guiding recovery, there are studies that blame planning for making recovery slow and inefficient, and argue for letting the market and private interests guide recovery (Chamlee-Wright & Rothschild, 2007; Chamlee-Wright & Storr, 2011). There are also disagreements in the literature about physical versus process orientation of the disaster recovery planning and plan (Johnson & Hayashi, 2012). The former suggests recovery planning is the act of making a physical plan with land-use maps and regulations to decide how and where to rebuild what is damaged by the disaster. The latter suggests that the recovery plan should document decisions and agreements among responsible agencies for each recovery task, cooperations and partnerships that will be enacted after the disaster, timing of completion of each task, financial resources, etc. In my synthesis of recovery literature, I include these different perspectives, as they each offer insights for setting the success criteria of planning process and plan for recovery.

The relatively limited application of research findings about disaster recovery to recovery planning practice could be in part due to the limited generalizability of case studies and little effort for synthesizing them. The existing literature on post-disaster recovery offers valuable insights for understanding the necessity and opportunities for planning as well as the challenging context in which recovery planning is often carried

out. Rarely have disaster researchers sought to synthesize findings of recovery studies in terms of the challenges and lessons for recovery planning practice after disasters.

General theories of planning, specifically collaborative planning theory which emphasize complexity and diversity in planning, can offer valuable insights to improve recovery planning process. To apply theories of planning to the special case of post-disaster recovery, it is necessary to identify the needs and challenges of the task of post-disaster recovery planning. Also studies on quality of plans can inform evaluation of disaster recovery plans. It is important to adjust general plan evaluation criteria to take into account specific issues that recovery plans should respond to, such as the complex and evolving nature of recovery needs with time.

Recovery planning practice by local governments, particularly following large disasters, can be influenced and guided by the federal policies and programs which regulate and provide expertise, technical, and financial assistance in the aftermath of federally declared disasters. Federal policy for recovery planning was formally developed by Emergency Support Function 14 (ESF#14) in National Response Plan (NRP) in 2004. ESF #14 was created to promote a community-centric, coordinated, long-term approach to recovery, with a focus on organizing and leveraging federal resources and providing enhanced technical assistance to states and communities.

NRP was superseded in 2008 by the current National Response Framework (NRF), which further outlines the mission and role of ESF #14 with Long-Term Community Recovery (LTCR) program. LTCR program was activated for presidentially declared disasters to help the impacted communities to identify and coordinate

significant recovery resources, undertake impact analyses, facilitate the organization and coordination of recovery partners and stakeholders, identify recovery needs and opportunities for collaboration and support, and support launching community recovery plans (Rozario, 2001). LTCR continued to evolve until 2011 when its work helped catalyze the development of the National Disaster Recovery Framework (NDRF). As the NDRF was implemented and Recovery Support Functions (RSFs) were developed, ESF #14 transitioned to the Community Planning and Capacity Building RSF which expanded and replaced the LTCR program. These federal recovery policies and programs, that influence (or fail to influence) recovery planning efforts by local governments, should be evaluated and, thus, informed by success criteria derived from planning and disaster recovery literature.

In this article, I present an integrative review of the studies on the recovery process and the emerging recovery planning literature along with the theories of planning, with special focus on collaborative planning, and plan quality literature to lay out a set of evaluation criteria of what is a good recovery planning process and what is a good recovery plan. Then I apply the resulting criteria from distillation of these bodies of literature to evaluate and critique federal policies for recovery planning. More specifically, I start with synthesizing the findings of a number of recovery studies in search for challenges, opportunities, and considerations for recovery planning. Second, I explain what theories of planning are trying to accomplish, and how they relate to and inform recovery planning as a special application. Third, I synthesize the findings of recovery planning case studies to identify the success criteria of recovery planning

process. Fourth, I synthesize the plan quality standards with disaster recovery considerations to derive success criteria for a recovery plan. Finally, I apply the distilled success criteria from previous research to evaluate the federal recovery policies that influence the recovery planning by local governments. I answer four questions in this article:

- What are the unique features of disaster recovery phase that present challenges, opportunities, and important considerations for recovery planning?
- What are the success criteria for a recovery planning process?
- What are the success criteria for a recovery plan?
- What can theories of planning and studies of recovery planning offer to improve post-disaster recovery planning in terms of process and product (plan) from how it is guided by ESF14 LTCR program in NRF and Community Planning and Capacity Building RSF in NDRF?

Methodology

I used integrative literature review method to explore and synthesize the literature. The integrative literature review is a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way, such that new frameworks and perspectives on the topic are generated (Torraco, 2005). Integrative literature review is useful when research on a phenomenon emerges in different fields (Torraco, 2005). My objective is to identify a set of evaluating criteria, informed by theories of planning, for success of recovery planning process and recovery plan.

Integrative literature review is appropriate for my objective for two reasons: first, I will combine scholarly work from different fields of planning theory and disaster recovery; second, new research is emerging on recovery planning by planning scholars as opposed to most of the previous knowledge about recovery which have a sociological perspective. Integrative literature review method provides an opportunity to synthesize findings of the sociological case studies of recovery process with studies of recovery planning as well as theories of planning.

The literature is the data of an integrative literature review. I obtained my data through multiple steps. First I searched JSTOR, Scopus, and Google Scholar databases with a number of different keywords including disaster recovery, disaster recovery planning, disaster recovery plan, hazard planning, disaster recovery policy, national response framework, emergency support function, long-term community recovery, recovery challenges, and recovery opportunities. Second, I used the same keywords and searched the databases of disaster related journals including: International Journal of Mass Emergencies and Disasters, Disasters, Environmental Hazards, Natural Hazards, and Natural Hazards Review. I also searched the databases of planning related journals: Planning Theory, Planning Theory & Practice, Urban Affairs Review, Journal of the American Planning Association, Journal of Planning Literature, and Journal of Planning Education and Research. I searched for both recently published and older literature. Reviewing the citations from the articles obtained through the search of selected databases was particularly helpful in finding older studies as well as policy documents which may not be easily found by searching scientific databases.

The retrieved studies and documents were critically appraised to identify relevant and robust research. I set inclusion criteria for studies I want to review. These consist of clear focus on long-term recovery rather than short-term recovery or response, having planning or sociological perspective in the study, using qualitative case study or policy analysis approaches, and being published in English. Regarding the studies and other sorts of publications on theories of planning and plan evaluation, I searched for the ones which provide either a classification of theories with their premises, strengths and weaknesses, and implications or the ones which focus on one theory and develop the premises, strengths and weaknesses, and implications in detail. In total, I selected and reviewed 103 research papers, policy documents, books, and theory essays. 34 of these works were then uploaded to Atlas.ti for thorough and systematic analysis through coding, while the other 69 documents were reviewed but coded selectively, as opposed to comprehensively, using the coding system I had developed for the first 34 documents.

In Atlas.ti every piece of text is called a "Primary Document" which I call document hereafter. I grouped the retrieved and selected documents into six "Document Families" based on the source and topic of each document. The six Document Families I created include FEMA reports and guides, NDRF and NRF critiques, plan quality studies, planning theories, studies on post-disaster situation, and recovery planning studies. To guide the thematic analysis of the findings and recommendations of the selected studies and documents, the first step was developing a coding system. I used the questions outlined in the previous section to outline a coding system. My initial coding

system consisted of a number of codes and code families related to my questions, such as elements of recovery planning process. I identified and marked quotations in the documents that responded my questions with relevant codes. As I kept going through each document I decided to change the names of some of the codes, merged some of them with others, or generated two new codes from one code and split the quotations as appropriate. These codes were later collapsed into themes and formed my final coding system. My coding system includes five Code Families and 48 codes, presented in Appendix 1. Depending on the number of quotations associated with a particular code, that code helped me identify elements that were "grounded" in the literature (as my data). The analytic functions of Atlas.ti, such as "Code Co-occurrence", enabled me to synthesize different insights associated with the same piece of text. Also, to relate insights of various authors on similar issues, I used Codes-Primary Documents Table to count quotations for each code by document and by document family. In this way, I could count the number of studies that discussed or suggested an issue or element of recovery planning. It also enabled me to compare the extent of "groundedness" of different elements. The output of Codes-Primary Documents Table from Atlas.ti is presented in Appendix 2. The result of my literature review are organized by the themes that summarize the literature and respond to the questions of my study.

Findings

The themes that emerged in analysis and synthesis of literature fall into four large and distinct categories. First category is about the context in which recovery planning in undertaken including the need for recovery planning, challenges of planning in post-

disaster situation, advantages of post-disaster situation for planning, and finally, considerations for recovery planning. The second category is the elements of a successful planning process according to the various theories of planning, characteristics of a successful recovery planning process as recommended by studies of recovery planning, and finally, as the federal recovery policy lays it out. The third category is concerned with the elements and characteristics of a good recovery plan, first according to the plan quality studies, second according to the recommendations of recovery planning studies, and finally, as it is laid out by the federal recovery policy in the ESF14 LTCR and then in NDRF. The fourth category summarizes the critiques of the federal recovery policy with respect to the recovery planning process and plan.

Context of recovery planning

There is a general consensus on the value of planning for recovery and its timing as a critical factor. While studies increasingly show that communities need to plan in advance for recovery, recovery planning is most often carried out post-disaster. Post-disaster circumstance present a host of challenges and dilemmas, which many of the times undermine the value and possibility of planning. Nevertheless, post-disaster circumstances are shown to also provide unique opportunities for planning. This section starts with circumstances that call for planning to succeed in recovery. Then, I discuss challenges and opportunities for planning in the post-impact period, and finally, drawing on a combination of challenges and opportunities, a number of important considerations for planning are discussed. Table I presents the codes that I developed associated with these topics while reviewing the literature.

Need for planning and Planners

Willingham spangle and associates (1991) propose a generic building timeline for the rebuilding activities – clearance of the housing, the restoration of infrastructure, business recovery, replacement of public facilities, and planning for the overall rebuilding effort. Similarly, Haas et al. describe the recovery as an ordered, knowable, and predictable process, in which there is a strong community desire to return to normalcy following a disastrous event, which can take from two to ten years to be completed. While their comprehensive study provided insights that are validated through several next cases, their ordered notion of recovery has been strongly disputed (Rubin et al., 1985). The reviewed literature describes the recovery process as a complex array of overlapping, often uncoordinated activities, differential access to the resources and power, disputes, and reliance on adaptive post-events actions (Berke et al., 1993; Bolin & Bolton, 1983).

Through planning for recovery, communities can deliberate and make informed decisions on how to seize the space and opportunity provided by a disaster. There is a strong emerging consensus among researchers, practitioners, and policy makers that in order to better manage such process we should plan for recovery. Disasters can provide a space in which significant change can occur in socioeconomic, organizational, political, and environmental domains (GAO, 2009; Godschalk, 2003). Such changes may not be possible otherwise partly because of the expense associated with removing the existing undesirable structures, or even social settings in some cases. This space allows for unplanned, and often unnoticed, change to occur. It also allows for planned and

purposeful change with a set of specific objectives and interventions to occur (Birkmann et al., 2010). Many researchers have noted that the value of the predisaster plans and pre-existing planning institutions in helping facilitate recovery and presenting consensus policies and views about the future (Inam, 2005; Olshansky et al., 2006; Rubin et al., 1985; Schwab, Topping, Eadie, Deyle, & Smith, 1998; Spangle, 1986).

Local governments can manage to secure additional resources for hazard mitigation in the aftermath of a disaster by planning. Planners and city officials find themselves in a position to accelerate mitigation in the post-disaster period; because, a disaster captures people's attention for such matters like nothing else. This attention span can be very short, however, unless local officials are able to focus it quickly and point to existing plans to address the problem because there is little time in the recovery period for developing plans from scratch (FEMA, 2009).

Table I Codes that characterize circumstances for recovery planning, Atlas.ti output

Codes that characterize circumstances for recovery planning	# quotes / # times grounded	# articles that discussed
post-disaster situation_need for planning	13	6
post-disaster situation_Dillema: challenge for planning	15	10
post-disaster situation_other challenges for planning	11	5
post-disaster situation_Opportunity: advantages for planning	10	6
post-disaster situation_considerations for planning	29	11

As mentioned earlier, several other researchers note that the lack of pre-event planning for post-disaster recovery leads to various difficulties and missed opportunities in recovery. It often limits the incorporation of disaster resilience measures into the physical reconstruction of communities because it is difficult to obtain buy-in from residents for new regulations, and also, there is not enough time to develop appropriate and adequate measures (Berke & Campanella, 2006; Burby et al., 1999). Lack of pre-event planning also hinders the reconstitution of social networks, especially because more vulnerable populations will have a higher chance of displacement. Finally, without advance recovery planning achieving long-term goals such as the preservation of environmental systems and the rebuilding of local economies will face major challenges or even ignored (Berke, 1995; Berke & Beatley, 1997; Berke et al., 2014; Berke et al., 1993; Cutter et al., 2013; Haas et al., 1977; Rubin et al., 1985; Smith, 2011, 2014; Smith & Birkland, 2012; Smith & Wenger, 2007). Moreover, the aftermath of a natural disaster can be an extremely difficult period for public officials seeking to restore normalcy to the community and to rebuild. In such circumstances, a well-organized plan rooted in good factual details can make the process manageable, and give the sense that someone is in charge and had the foresight to think through the issues and contingencies that the community might face during the long process of reconstruction (FEMA, 2009).

Challenges of planning

Recovery has to proceed in an environment often characterized by complexity, uncertainty, dilemma, changing conditions, conflict, and tension. It is a process that operates within an emotional, reactionary, time-sensitive, expensive, and politically

charged atmosphere that is based upon incomplete information, disproportionate needs, and the worst working conditions (NaturalHazardsCenter, 2001). Planning under such circumstance has to face specific challenges.

The disaster recovery process is not a set of orderly actions triggered by the impact of a disaster upon a community. Rather, it is a set of loosely related activities that occur before, during, and after a disastrous event. Therefore, planning for disaster recovery must place more emphasis on conditions of high uncertainty, rapid change, and complexity to improve prospects for disaster resiliency (Olshansky & Johnson, 2010; Olshansky et al., 2008).

Dynamics of political and economic processes at all of the spatial scales influence the directions of the post-disaster reconstruction and redevelopment, and make recovery outcomes malleable and by no means over-determined (Johnson & Hayashi, 2012). The scale of the disaster damage and impacts can also significantly influence the recovery process. Catastrophes, in particular, take longer to recover from, and present a more complex array of recovery challenges (Glaser, 1992; Tran, Shaw, Chantry, & Norton, 2008). Hence, more formally acknowledging the nonlinearity, inevitable change, and fuzzy ending of the recovery could benefit recovery related policymaking.

Relief and short-term recovery efforts should be urgent and rapid; however, redevelopment policies should be cautiously developed upon comprehensive, site-based assessments of risk and vulnerability, alongside continual consultations with all stakeholders (Ingram, Franco, Rio, & Khazai, 2006). The desire to return to normalcy also competes with the value choices to pursue betterments such as improved efficiency,

equity, or amenity (Berke et al., 1993; Bolin & Stanford, 1998; Olshansky, 2006). Recovery decision-making must go faster than information, knowledge, and planning generally flow (Olshansky et al., 2012).

Disaster recovery is characterized by tensions over how to strike a balance between the speed of recovery, the time required to develop and implement sound recovery policy informed by ongoing deliberation (Nelson, Ehrenfeucht, & Laska, 2007), and by the perceived need to ensure accountability in the use of public resources; or as Kates put it, between "mixed motivations" (Haas et al., 1977). Bates (1982) sees conflicts emerging between bureaucratically run organizations oriented toward relief operations and more grass-roots developmentally oriented organizations which assume reconstruction tasks over how programs should be implemented (Bates, 1982). Bureaucratically run organizations, which implement recovery assistance programs by dispensing federal money, are constrained by congressional authorization and appropriation provisions to prevent fraud and also local development policies that can increase long-term risks to achieve short-term profits. To pursue their proposals, local development organizations, in many cases, rely on federal recovery funds, which should be spent with accountability and responsibility. While constraints associated with accountability can potentially reduce the speed of recovery, dependency on federal funds might have potential positive impacts on recovery by refusing to spend tax-payers money on potentially harmful local proposals.

Post-disaster planning is undertaken in an environment that can be hostile to the important preconditions of success, such as the meaningful involvement of the

community members and stakeholders in a sustained, deliberative process (Smith, 2011). Decisions affecting community welfare—some of which may have long-lasting impacts—will have to be made under intense pressure and scrutiny, and it will be impossible to take into account the views of all the pertinent stakeholders. While people and groups are busy trying to seek temporary housing, pick up debris, navigate complex, bureaucratic grants and loan options and insurance settlements, and confront a host of other problems, decisions that are often made could fundamentally alter the nature of communities (Smith, 2011). One consequence is that the community may miss opportunities to improve its infrastructure, economy, environment, or quality of life (NaturalHazardsCenter, 2001).

Smith (2011) notes that planners who are assigned after a disaster to participate in ESF#14 LTCR often have limited experience in recovery operations _*i.e.* working under the above circumstances_ which undermines their credibility in an environment where many FEMA officials question the importance of post-disaster recovery planning. To diminish anxiety and frustration associated with uncertainty, planners must aim to minimize the time needed for short-term recovery efforts including helping people to recover a safe shelter and livelihood security. During this ‘‘transitional’’ phase, it is critical that communities are consistently supported, consulted and informed as longer-term plans are developed (Ingram et al., 2006; Olshansky et al., 2008).

Opportunities of planning

Post-disaster situation provides a number of unique opportunities for planning. One of the most cited opportunities is for reconstructing an area where, prior to the

disaster, the productivity of social assets was far below its potential level, and damage allows the community to move on to a more valuable use of some of its remaining assets (Leonard & Howitt, 2010)

The other opportunity is the increased public awareness of risk and motivation for action. There are specific times in the cycle of natural disasters when people become more receptive to messages concerning change. In communities that endure repeated disasters, after one disaster is the same as before the next. The increased awareness created by the last disaster can provide impetus for pre-disaster planning for the next one including the opportunity to incorporate community building (NaturalHazardsCenter, 2001). Community members who are struck by a disaster are motivated to participate in decision making for the future since the images and memory of destruction stays with them for a while, and also, they feel the need to come together to recover in what is called by some researchers as "therapeutic community" (Alesch et al., 2009). Once the issue has gained that profile, a crucial component of the planning process is to propose and organize a multiagency task force that will involve all key players in local government in soliciting public input and molding it into a plan of action (FEMA, 2009).

The immediate aftermath of a disaster may not be the ideal time to start constructing a plan for long-term reconstruction, because people are anxious to restore normalcy to their lives. However, in most disasters, there is about a 30-day window of opportunity to incorporate a planning framework into the disaster recovery effort. It is also an ideal time to raise awareness that a process needs to be undertaken to reexamine land-use patterns and to plan for the aftermath of future disasters (FEMA, 2009). The

reason I would suggest behind this statement from FEMA is that public support for acting to reduce the risk of future disasters will diminish with time as people and even officials will forget the destruction by disaster and importance of the issue. There is a strong tendency among disaster victims to return to normal life, and forgetting the destructions is a necessary part of returning to normalcy.

The 30-day window of opportunity suggested in the FEMA guide (2009) could be referring to the approximate time before a community returns to some degree of normal life. However, the desire for restoring normalcy should not lead to forgetting the importance of disaster risk reduction. To ensure disaster risk reduction stays on the agenda, while the window of opportunity is still open, local governments with help of planners, policy makers, and grass-root community groups should try to incorporate a planning framework to develop appropriate recovery policies and actions. It is reasonable to say that the window of opportunity for establishing a planning framework and obtaining support for planning could be as short as a month; however, the planning process itself is suggested to take a longer time (Nelson et al., 2007; Olshansky & Johnson, 2010; Olshansky et al., 2008; Olshansky et al., 2006). If there is no pre-disaster plan for post-disaster recovery and reconstruction, then, the immediate aftermath of a disaster is a time for planners to look toward fostering an ongoing and probing discussion of how the community will address its vulnerabilities in the future.

Considerations for planning

Post disaster period involves a high level of uncertainty, confusion and conflict, both at the community and the individual level. At the community level, confusion

among those who are expected to lead the recovery process can cause challenge. One possible source of confusion at the community level, could be local officials assuming and expecting certain kinds of assistance from particular State agencies that are not or are no longer the responsibility of those agencies. There can be confusion at the individual level too. For example citizens who are eligible for receiving federal assistance to rebuild or repair their damaged houses are sometimes confused and uninformed about regulations that dictate how to spend that money, and therefore, become ineligible due to duplication of benefits. Therefore, one of the important considerations for planning in the aftermath of a disaster is setting clear standards and procedures for communication among the many partners and stakeholders involved in planning. Quarantelli (1999) calls attention to the necessity, whether by planners or operational personnel, to specify what they mean when they use one and/or all the different labels for recovery including but not limited to restoration, rehabilitation, reconstruction and recovery. Likewise, others to whom the terms are directed must also have the same meaning in mind. Otherwise there will be miscommunication at best and conflict at worst (Quarantelli, 1999). Clear definition facilitate communication, prevents unrealistic expectations, and also conflict.

Size of the disaster is another important consideration for planning. One major difference between the community level and regional or national level disasters is that, the larger the disaster, not only is there more likely to be greater short and long run needs, but also certain kinds of nearby assistance that would be present in smaller type disasters are less likely to be available. A policy implication of this is the need for

different kinds of planning and managing for catastrophes compared with disasters. This is as true, if not more so, for recovery processes as it is for anything else (Quarantelli, 1999).

A successful recovery planning process

Both general theories of planning, particularly the collaborative planning theory, and more recently, case studies of recovery planning offer valuable insights to understand what are the characteristics and elements of successful recovery planning process. I used two separate Family Codes (PLANNING THEORIES and RECOVERY PLANNING PROCESS) to summarize these insights from two different Document Families including "recovery planning studies" and "planning theories". Table II presents the codes that identify success criteria for recovery planning process with the number of quotations associated with each code (groundedness) and the number of studies that discussed it.

Theories of planning for evaluating planning process

I outline my discussion of success criteria for planning process around five major theoretical perspectives that have the most relevance and inspiration for recovery planning, and principals of which have penetrated the field of recovery. The classification I present are neither exhaustive, nor mutually exclusive.

Table II Codes that identify success criteria for recovery planning process

Codes that identify success criteria for recovery planning process	# quotes	# articles that discussed
recovery planning process: adaptive/learning	13	8
recovery planning process: address conflicts	26	10
recovery planning process: build capacity	23	8
recovery planning process: collaboration-cooperation	59	14
recovery planning process: data	6	1
recovery planning process: deliberation	5	4
recovery planning process: diversity	6	4
recovery planning process: inclusive	34	13
recovery planning process: integrate vulnerability	10	7
recovery planning process: leadership	7	3
recovery planning process: local	49	13
recovery planning process: multiobjective	5	3
recovery planning process: proactive	44	10
recovery planning process: long-term	21	8
recovery planning process: partnership	2	2

For several decades, the traditionally dominant paradigm in urban planning was the rational model, whose defenders' have faith in scientific method and positivism. Within planning practice, it has primarily been used for forecasting impacts and program evaluation. A good planning process, according to rational planners, is one that relies on sound data and scientific analysis. This model is suggested to be sometimes more concerned with the process of planning at the expense of its distributional outcomes. Positivist mental model skips the step of deliberation over the dynamics of change or the practicalities of proposals. The technical/bureaucratic planners, driven by rational model

thinking, typically discuss goals and projects with citizens, but bypass substandard policy issues. Consequently, citizens and stakeholders who don't have the technical expertise will get only more confused and alienated, feel as outsiders in the process, and lose their interest and motivation (Innes & Gruber, 2005).

Inspired by postmodernist cultural critique and by the move among philosophers away from logical positivism toward a substantive concern with ethics and public policy, planning theorists have reframed their debates over methods and programs to encompass issues of discourse and inclusiveness. The new planning theorists sought to understand planning in phenomenological and critical theory traditions rather than to develop laws or principles on how to do planning (Charmaz, 2006).

Three approaches that stemmed from the movement toward inclusiveness and discourse are the communicative model, the new urbanism, and the just city (Fainstein, 2000). The first approach, sometimes called the collaborative model, emphasizes the planner's role in mediating among "stakeholders" within the planning situation (Innes, 2004; Innes & Booher, 2004); the second, frequently labeled neotraditionalism, paints a physical picture of a desirable city to be obtained through planning, and the third, which is derived from the political economy tradition, although also outcome oriented, is more abstract than the new urbanism, and presents a model of spatial relations based on equity (Fainstein, 2000).

Each theory of planning has certain implications for guiding recovery planning. Collaborative dialogues are suggested and used as new ways to decide on public action, ways which are more inclusive of interests, and more open to new actions and

opportunities (Innes & Booher, 2003). Implication of collaborative model for recovery planning is engaging key stakeholders, anticipates the conflicts that can emerge in the aftermath of a disaster, and try to build consensus around a recovery vision. Advocates of collaborative policymaking suggest that it is a way to establish new networks among the players in the system and increase the distribution of knowledge among these players. This recommendation has been echoed by disaster recovery scholars who emphasize the need for stronger collaboration in the disaster assistance networks based on increased understanding of the needs and responsibilities of other agencies, local governments, and the local stakeholders (Smith, 2011, 2014; Smith & Birkland, 2012; Smith & Wenger, 2007) This includes knowledge of each other's needs and capabilities and of the dynamics of the substantive problems such as disaster risks.

The rational model calls for incorporating sound, reliable, and objective data, undertaking scientific analysis and projection techniques in hazard, and risk assessment as well as damage prediction. The political economy perspective or just city model has inspired the disaster scholars/planners who more recently emphasize understanding the impact of social vulnerabilities on recovery disparities and the spatial distributions of physical and social vulnerability, hazard exposure, response, and recovery.

New Urbanism has also provided insights to disaster recovery planning in terms of proposals for rebuilding in a more sustainable and resilient way. Berke and Campanella (2006), among others, discuss new urban models as a potentially useful approach for improving resilience as an antidote to low density developments in hazard prone areas. However they noted that location of these new urbanist developments

should be carefully decided to avoid putting high density compact developments in harm's way (Berke & Campanella, 2006; Berke et al., 2014; Berke & Glavovic, 2012).

One of the terrains of planning thought is concerned with the ability of planners to make a real difference in the form and development of communities. This body of literature has important lessons for recovery planning, since the role of planners has been traditionally minimal in recovery management. Many planners today avoid engaging in value discussions (Campbell & Marshall, 2002), prefer to refer to their role as neutral (Bazeley & Richards, 2000), and seldom make any claims for greater professional autonomy (Campbell & Marshall, 2002). This is in part due to the relative dominance of positivist approach which does not typically incorporate the reality of politics and its many interests, leading to a big disconnect between professional analysis and getting things done (Charmaz, 2006). Coupled with the traditional dominance of emergency managers in recovery efforts, assumed neutrality of planners in the typically contentious post-disaster environments has further weakened their potential for making sound policies among the conflicts and tensions. To get planning out of this weak situation some authors have emphasized the need to situate the actions of planners within their wider discursive contexts to better articulate the underlying values of planning, and further problematize planners' judgments and responsibilities. All of these authors seem to agree that what is needed is recognition of the importance of planning being engaged with politics, rather than becoming a tool for it.

Elements of a successful recovery planning process

Recovery planning studies constitute the second group of documents I reviewed to find success criteria for recovery planning process. Resilience and sustainability are frequently suggested as the overarching goals of recovery; therefore, criteria of good planning process and good plan for recovery can be derived from sustainability and resilience. Resilience implies the adoption of pre-event measures that prepare a community for a disruption, and prepositions the community—and other members of a larger disaster assistance network—to act in a coordinated manner when a disaster strikes. Indeed, Godschalk (2003) argues that resilience should include developing strong social networks that are armed with current information about a community's vulnerability, lessons derived from past events, and the resources to confront the challenges associated with the disaster recovery (Godschalk, 2003).

Resilience is the most agreed upon goal or vision for disaster recovery planning among disaster scholars. A successful recovery planning process can be evaluated in terms of the extent to which it can advance disaster resilience. To strive for resilience entails building back to be safer, healthier, and more equitable, and better able to absorb, recover from, and successfully adapt to future adverse events (Berke, 1995; Berke & Beatley, 1997; Berke & Campanella, 2006; Berke et al., 2014; Berke & Glavovic, 2012; Berke, Smith, & Lyles, 2012; Birkmann et al., 2010; Burby et al., 1999; Horney, Berke, & Van Zandt, 2015; Ingram et al., 2006; Olshansky & Chang, 2009; Peacock et al., 2006; Smith, 2011, 2014; Smith & Birkland, 2012; Smith & Wenger, 2007).

Studies and essays about long-term recovery suggest recovery planning would benefit from setting a long-term and broad scope for itself. Reliable accurate data and analysis, along with input from a diverse group of citizens should inform the recovery planning process from crafting a vison to proposing specific actions. At the same time, it is suggested that planning process requires a capacity to adapt to the new emerging needs, constraints or opportunities, particularly during post-impact recovery planning. Recovery planning may be more successful if it is based on a collaborative process with strong leaders who recognize and seek consensus around conflicts. Finally and perhaps most frequently researchers call for adopting a proactive approach to recovery planning (i.e. establish the process pre-impact) which could be argued to be the prerequisite for achieving several of the aforementioned elements of success.

Since early 1990s, disaster researchers have attempted to draw attention to the opportunity recovery period offers to strengthen local organizational capacity to facilitate economic, social, and physical development long after disaster. However, the dominant approach of the aid and recovery programs, they observed, has been toward short-term relief, with little linkage to long-term development, local roles and capacities and diverse social, economic and cultural conditions. External programs do not always successfully match local needs or cannot be successfully implemented without intra-local and intergovernmental collaboration and cooperation. Based on these observations, researchers call for greater understanding of community needs and capacities, and how to put into practice those understandings by relevant institutions before disaster strikes (Berke et al., 1993).

Accurate data is the foundation for recovery planning

The starting point of the planning process must be an identification of the hazards facing the community, and the risks they pose to life and property (FEMA, 2009). Empirical research by French et al. (1984) indicates that "high-quality information (hazard data, mapping, interpretation, etc.) would translate reasonably into less damage from earthquakes," (French, Ewing, & Isaacson, 1984) and, by extension, for other well-researched hazards as well. Most important data requirement which should be addressed in the planning process are related to hazard identification, vulnerability assessment, and risk assessment (FEMA, 2009).

The choice of appropriate strategies will depend on the technical data concerning the feasibility of specific strategies for coping with local hazards, political preferences for specific approaches to the problem, and cost implications. Because predicting the future is strictly a matter of probabilities, the only certain data come from past experience. Thus, planners documenting risk must include in their reports the history of previous natural hazards events, their magnitudes, and an inventory of the human and property damages that occurred. They should also conduct surveys of representative samples of the community and collect data on public needs in different phases of a disaster, such as preferences and perceptions about various approaches to disaster mitigation in the aftermath.

Recovery planning must be a local responsibility, based on local needs

Disadvantaged communities are often more vulnerable to disaster impacts not just because of the inherent lack of wealth, but because decisions were made about

features of risk and vulnerability in these communities without their input or consent (Dash et al., 1997). Recovery planning is an opportunity for such communities to take more control on these matters. Planning can also help stakeholders understand that federal and state goals are not necessarily the same as community goals.

The existing socioeconomic dynamics within a given community are more important than the models used for designing recovery programs (Christoplos et al., 2010). Aid intervention initiatives are found to be successful when program goals and policies are responsive to community needs, and build a strong inter-organizational capacity for assessing needs and carrying out appropriate goals and policies. Pre-disaster planning and post disaster rebuilding and recovery offer opportunities to strengthen local organizational capacity to facilitate long-term social, economic, and physical development. If relevant institutions are in place before the disaster strikes, local people will be able to define their own goals, exert control over the use of incoming aid, and tailor the design of recovery programs to domestic needs and capacities (Berke, 1995).

Robert Kates (1977), summarizing the work of other disaster scholars, notes that advisory services provided by outside technical experts rarely alter the pre-event growth patterns and post disaster development strategies that are advocated by entrenched development interests (Haas et al., 1977). Also, governmental centralization in the form of elite professional direction of the process, is shown to lead to forms of reconstruction, particularly in housing and urban design which do not conform to local needs and culture (Geipel, 1991; Oliver-Smith, 1990; Oliver-Smith & Hoffman, 1999). The findings were consistent with the experience of several professional associations that

attempted to alter development patterns in New Orleans and coastal Mississippi after Hurricane Katrina (Corbin & Strauss, 2008; Olshansky & Chang, 2009). However, there is much local government can do with the assistance of federal government and states, to reduce losses from natural disasters through land use planning and management. Limitations can be overcome, if localities are encouraged to plan for the development and redevelopment in hazardous areas prior to undertaking risk-reduction programs (Burby et al., 1999).

Recovery planning must be proactive

In their discussion about acting in time against disasters, Leonard & Howitt suggest that there may be actions that can be taken in advance of the event that will prepare for a more rapid recovery: Advance recovery efforts are designed to make whatever recovery does need to take place more efficient, rapid, and effective (Leonard & Howitt, 2010). Planning is one of the most important preparations for recovery. Many planning scholars argue that recovery outcomes are improved when pre-disaster planning and coordination occurs. They ground these in the idea that planning for all dimensions of emergencies, disasters, and catastrophes has been shown to improve outcomes, and communities that plan for disasters, before and after the events, are more successful than those who do not, other things being equal (Basolo et al., 2009). Nevertheless, the federal government and state government generally do not provide all or even most of the range of the sources needed for pre-event planning.

Communities, states, and nations, often seem to think that time-consuming activities, like planning and other consensus-building techniques, are primarily

employed after a disaster, and therefore, slow the overall pace of recovery. In practice, many stakeholders have resigned themselves to this reactive approach. However, deliberation may not slow recovery, particularly if it is practiced pre-event (Smith & Birkland, 2012). When no disaster is in the horizon, communities have time to create decision support tools for scenario building and testing to improve their pre-disaster recovery plans (Berke & Glavovic, 2012).

Recovery is more efficient and more effective when planning and partnership development precedes a disaster, rather than following it. Pre-disaster recovery planning can increase local capacity to recovery through providing an opportunity to improve horizontal and vertical integration among aid providing and local agencies, assess local needs, and improve the timing of recovery (Smith, 2011). Planners can most effectively use the data skills during the pre-event phase as the timing of assistance provided by planners is crucial to their successful involvement in recovery.

Recovery planning must have a long-term focus and broad scope

Successful recovery, sometimes referred to as holistic disaster recovery, should have both immediate and lasting impacts that are self-supporting, and will make a community better off than before. This ideal disaster recovery process is one where the community proactively manages recovery and redevelopment decisions to balance competing interests so constituents are treated equitably, and long-term community benefits are not sacrificed for short-term individual gains (NaturalHazardsCenter, 2001).

Recovery planning should incorporate a balance between short-term and long-term development objectives. To accomplish the objective of long-term strategic

planning, multi-year and multi-sector policies need to be developed to facilitate the sustainable management of coastal resources, livelihood support, strengthening infrastructure, urban planning, insurance tools and disaster preparedness at the national, regional and community level (Ingram et al., 2006).

Recovery is interrelated with several other aspects of community development and planning. Planning for post-disaster recovery and reconstruction needs to be well integrated into the community's comprehensive plan and stitched into its larger vision of its own future. Not only does this open up much larger options for attracting outside resources to aid in post-disaster recovery and reconstruction, but it also helps the community itself to identify more creative solutions to a range of problems exposed by the damage wrought by a disaster. Furthermore, it provides an opportunity to identify a range of resources to assist in dealing with ongoing or pre-disaster mitigation issues (FEMA, 2009).

Recovery planning needs strong local leadership

Addressing the issues of recovery requires the active involvement of local officials. But often left unresolved is who at the local level should take responsibility for developing a long-term recovery plan – or, for that matter, managing long-term recovery efforts (Smith, 2011). An interdisciplinary reconstruction planning task force is the best way to guide the process of constructing the plan. Who organizes the planning task force ,and ultimately, takes responsibility for driving the process is a question central to the success of the entire planning process. Ideally, this role should fall to the community's chief executive, whether that be a mayor, city or town manager, or county executive or

board president. It is vitally important that the lead agency or official in the planning process has the clear support of the mayor or town manager in order to ensure the full cooperation and support of the other participants. (FEMA, 2009)

Organizing appropriate representation on the planning task force is important in such an interdisciplinary effort as recovery planning. Two considerations enter into forming the task force: whose participation is essential in guaranteeing technical accuracy and thoroughness for the plan? And whose participation and support will enhance its political acceptability? In soliciting public input and building public support for the plan, it is suggested to involve some nongovernmental representatives in the task force (Schwab et al., 1998).

Recovery planning must involve diverse voices

Disaster resilience according to Berke and Campanella (2006) applies to the process of recovery planning in which all affected stakeholders—rather than just a powerful few—have a voice in how their community is to be rebuilt (Berke & Campanella, 2006). By involving and consulting residents in all phases of planning, the pre-disaster recovery planning process helps creating a knowledgeable constituency that is more likely to support redevelopment policies and programs that take effect once a disaster strikes. By gaining such community buy-in before the disaster, communities can avoid making decisions in the aftermath that may compromise what the community might achieve in the long term (Berke & Campanella, 2006; Haas et al., 1977; Oliver-Smith, 1990; Perry & Mushkatel, 1986; Rubin et al., 1985; Schwab et al., 1998).

Powerful interest groups, particularly from the business community, are found to be able to take advantage of recovery aid because of their strong pre-disaster control over local institutions and ties to central authorities (Berke et al., 1993; M. Bolton, 1997). Hence, pre-disaster recovery planning should engage vulnerable populations or stakeholders that are potentially affected by the plan (Berke & Glavovic, 2012; Johnson & Hayashi, 2012; Olshansky et al., 2006).

Failing to include the relevant local stakeholders who are potentially affected or possess resources, including the deep local knowledge-base and trusted relationships, can limit the search for creative solutions and the development of enduring agreements and plans, and can lead to further fragmentation and conflict among those who have not been engaged in the decision-making process. Moreover, failing by a community to fully participate in its own recovery efforts and decisions can lead to a problem of long-term dependency, which can hinder successful and complete recovery (Birch & Wachter, 2006).

Recovery planning should establish collaboration and cooperation

Since recovery is a multi-objective and multi-dimensional process, a wide range of stakeholders should work together to reach success or holistic disaster recovery. Therefore, one of the major elements of pre-disaster recovery planning should be establishing collaborations and strengthening cooperation among various recovery stakeholders from emergency management teams to local chamber of commerce. These stakeholders should collaboratively plan prior to disaster for post-disaster recovery.

Through collaborative planning, various stakeholders in any local network can gain a greater understanding of local needs over time and integrate the resources (financial, policies, and labor) into a collaborative recovery effort that meets local needs. Smith suggests that recovery planning based on consensus-building approaches provide the means to change the procedural characteristics of the disaster recovery assistance framework (Smith, 2011; Smith & Birkland, 2012).

Mileti (1999:10) describes recovery as a collaborative process, entailing decision-making and interaction among all stakeholders (Mileti, 1999). It should draw on local and traditional sources of knowledge and the best available scientific knowledge to inform stakeholders in the formulation of alternative recovery strategies (Berke & Glavovic, 2012). Establishing collaboration among recovery stakeholders depends upon horizontal integration among local players and vertical integration with higher level agencies (Berke et al., 1993). Communities with poor horizontal integration lack the stakeholder involvement needed to develop a collective vision of recovery.

The long-standing schism between emergency managers and land-use planners calls for more collaborative efforts that engage both groups prior to and in the aftermath of disasters. interstate and local agreements for shared use of personnel for response related activities following disasters, have great potential role in recovery (Smith, 2011). Diversifying such collaborative efforts to include disaster recovery planners and others who have dealt with long-term recovery issues would enable systematically addressing recovery, and also promoting a greater level of trust through repeated and sustained interaction over time. Collaborative planning for recovery should aim at fostering

relationships by enabling participants to identify common interests in pre-disaster recovery planning, share unique perspectives, and discuss the resources they can offer to address mutually agreed-upon goals and objectives (Innes & Booher, 2003), such as resilience.

It should be noted that sometimes mutually agreed-upon goals end up being goals that would either increase long-term risk to pursue short-term profits or goals that do not reflect the needs and priorities of the community (*i.e.* irrelevant). Goals that increase long-term risk may result from limiting community engagement to a like-minded group of local elites who are interested in their own short-term profits. The irrelevant type of goals might result from a process that is poorly informed with respect to data, analysis and local knowledge of the needs of everybody. A community engagement process might suffer from both of these issues but what is common is failure to include diverse voices especially the marginalized citizens.

Recovery planning process must recognize and build consensus around conflicting issues

As discussed in the previous section, collaborative model of planning engages stakeholders in processes of consensus-building based on diversity and interdependency of their interests, and aims at reaching win-win sustainable collaborations. Due to the contentious nature of recovery process, it is argued that recovery planning must be undertaken through alternative dispute resolution and collaborative planning strategies. Addressing the challenges of disaster recovery requires an environment that will

facilitate the emergence of collaborative problem solving among a network of stakeholders and assistance providers (Smith, 2011).

National hazards Center also recommends using consensus-building to achieve a holistic disaster recovery process (NaturalHazardsCenter, 2001). Murosaki (2007) proposed reaching a solid consensus on the goals and vision of the construction as one of the major construction principles. Also, Berke et al. observed that in communities with more diverse distribution of power and resources, conflict and confrontation often must occur in order for long term recovery to be effective (Berke et al., 1993).

Planners' training to analyze issues and identify potential solutions, facilitate policy dialogues, use participatory techniques, and resolution of conflicts are skills that are all uniquely suited to the challenges surrounding the coordination of long-term recovery and reconstruction activities. The collaborative approaches and plan making techniques that planners regularly use can generate multiple reconstruction options for consideration, and if these options can be discussed openly and well in advance of the disaster, local officials, the business community, and the public can weigh the merits of different recommendations, each informed by reliable information (Olshansky et al., 2009; Olshansky & Johnson, 2010; Smith, 2011, 2014; Smith & Wenger, 2007).

Recovery planning must aim at capacity building

In the aftermath of federally declared disasters, state emergency management agencies are often overwhelmed, lacking the resources needed to match FEMA staffing levels. In addition, their recovery capabilities, in most cases, are limited to grant managers and often do not include people with planning skills and expertise that is

particularly relevant to long-term recovery. Planning should include development of strong pre-event relationships and the sharing of information through both formal institutional ways, such as the disaster recovery committee, and informal information dissemination channels such as nonprofits, community groups, and faith-based organizations to help position communities to better confront the substantial challenges of disaster recovery.

Capacities, especially those related to the social capital, are more important than capitalization for benefiting from recovery investments (Christoplos et al., 2010). Therefore, the ability to receive and effectively use assistance is an important aspect of recovery policy. Several scholars suggest pre-event assessment of local recovery capabilities and the strengthening of identified weaknesses through plan making and targeted public investments (Birkland & Waterman, 2008; Christoplos et al., 2010; Johnson, 1999; Olshansky & Johnson, 2014). Pre-disaster planning should especially focus on mitigation efforts in high-risk areas, which are communities and neighborhoods left vulnerable because of social characteristics (Dash et al., 1997; Highfield et al., 2014; Peacock, Van Zandt, Zhang, & Highfield, 2014; Van Zandt et al., 2012), and involve residents of such areas in advance recovery planning to enhance their ability to recover when the disaster hits.

Recovery planning should adapt and evolve with new input

Recovery planning process should be adaptive in two directions: past and future. On the one hand, it should learn from the last disaster and apply those lessons to plan for the next one. Strong social capital is important for beginning the collaborative,

cooperative recovery planning process that would learn from the last disaster and plan for the next.

On the other hand, recovery planning process should also evolve with the new input from the actual post-disaster assessments. Recovery planning can use alternative potential scenarios to predict the post-disaster needs and conditions, which can be highly unpredictable. Therefore, the disaster recovery plan, once created, will need to evolve over time, and respond to new circumstances (FEMA, 2009; Rubin et al., 1985). Gaining an effective mix of representation can be a prelude to some creative cross-breeding of perspectives and adaptations in the planning process over the long term. Recovery planning process should enable a community to respond flexibly to the unexpected challenges of recovery, create decentralized and adaptive capacity, and, in doing so, minimize social disruption that results from uncertainty and lack of direction. The process of influencing decisions as an essential aspect of disaster recovery is viewed as the decision process that involves planning, organizing, leading, and controlling a comprehensive recovery vision, and influencing the many simultaneous decision actions required to achieve them as effectively and efficiently as possible. Flexible and forward thinking approaches similar to decentralized models used in crisis management can provide the capacity needed to influence these decision actions while also keeping pace with the compressed time frames of recovery.

As conditions inevitably change over typically lengthy time frames of recovery, the vision set forth in any post-disaster recovery plan need to be continually reviewed to ensure that activities are on track, a series of recovery plans may be necessary over time,

or new plans may need to be adapted to reflect new and changing conditions (Johnson & Hayashi, 2012). Rubin et al. (1985) observed that leadership with creative and flexible style of problem solving and decision-making, which allow for ad-hoc behavior rather than a by-the-book mentality, facilitate managing the complexities of recovery (Friese, 2012; NaturalHazardsCenter, 2001; Smith & Wenger, 2007).

Recovery planning must integrate vulnerability analysis and involve vulnerable citizens

There is an emerging emphasis in disaster literature on the importance of social vulnerability for disaster impact, recovery, and resilience (Bolin, 1982, 1985, 1993; Bolin & Bolton, 1986; Bolin & Stanford, 1998; M. Bolton, 1997; P. Bolton, 1979; Comfort et al., 1999; Cutter, 1996; Cutter et al., 2013; Cutter et al., 2008; Cutter et al., 2003; Cutter et al., 2014; Highfield et al., 2010, 2014; Lindell & Prater, 2003; Peacock et al., 2014; Van Zandt et al., 2012). There is evidence in the literature that shows the transient poverty (as one of the indicators of social vulnerability) created by the disaster can initiate vicious cycles that will trap a significant proportion of the population in chronic poverty, especially in poor communities. This is a challenge for recovery planning that can be tackled only by acknowledging the capacity gaps that exist in vulnerability analysis (Christoplos et al., 2010).

Consequently, a growing number of scholars have developed composite measures of vulnerability with spatial dimensions and call for integrating vulnerability analysis and involving vulnerable citizens in recovery planning, particularly in advance of an event (Berke & Campanella, 2006; Berke et al., 2014; Berke & Glavovic, 2012; Comfort et al., 1999; Cutter et al., 2013; Cutter et al., 2014; Highfield et al., 2014;

Horney et al., 2015; Peacock et al., 2014; Van Zandt et al., 2012). Nevertheless, vulnerability reduction is sometimes seen as a task that is too ambiguous and overwhelming to analyze, and there is a perceived absence of tools to integrate vulnerability analysis into development planning.

A successful recovery plan

Plan quality studies have offered several principals for evaluating plans in various planning domains (e.g. transportation planning, environmental planning, mitigation planning, etc.) (Berke, 1996; Berke & Conroy, 2000; Berke & French, 1994; Berke & Godschalk, 2009). From the convergence of these works, a number of core principles of plan quality have emerged that represent the main functions of a plan including goals, fact base, policies, implementation, and interorganizational coordination. These principals have measurable indicators that can be adapted to particular planning domains (Baer, 1997; Berke & Godschalk, 2009; Friesema, 1979).

Planning and disaster scholars are starting to apply concepts of plan quality to disaster-related plans (Berke, 1996; Berke et al., 2014; Berke et al., 2012). To adapt these concepts to pre-disaster recovery plans Berke et al. (2014) integrate the well-established plan quality principles with the anticipatory governance model. They argue that adaptive plan quality principles are suited to address highly complex and uncertain planning problems associated with rebuilding after a disaster. Accordingly, they offer six principles for evaluating quality of pre-disaster recovery plans: direction-setting principles that form the foundation for achieving future vision of disaster resilience include 1) goals that are transformative and restorative, 2) a fact base of alternative

plausible futures, and 3) flexible policies. Action-oriented principles which establish the uses and influence of the recovery plan consist of 4) interorganizational coordination to adapt to change, 5) participation practices to engage the public before and after the disaster event, and 6) implementation and monitoring to track actions and evaluate and adapt policies (Berke et al., 2014). These principals are consistent with the characteristics of a successful planning process I distilled from the recovery literature and general theories of planning. For example, in technical-bureaucratic style which is inspired by positivist-rational model, a good plan is one that meets all the requirements of legislation, is consistent with official agency goals, in this case FEMA, and has all needed backup information (Innes & Gruber, 2005; Lauria & Wagner, 2006).

Various approaches in recovery planning studies are used to suggest and prepare elements of disaster recovery plans. Table III presents the codes I used to summarize the elements of a successful recovery plan suggested by recovery planning studies. One of the critical, potential disagreements in the field of recovery research can be seen as a difference in viewing plans as physically orientated or process oriented recovery plans (Johnson & Hayashi, 2012). A recovery plan can be viewed as a policy document that should guide short-range emergency and rehabilitation actions (temporary housing, damage assessment, debris removal, restoration of utilities, re-occupancy permitting, reconstruction priorities) and long-range redevelopment decisions (building moratoria, re-planning of stricken areas, and relocation of housing to safer sites). A well-conceived process-oriented recovery plan conveys a sense to the public that local officials with recovery responsibilities are organized and in charge, because they had the foresight to

carefully consider the issues and contingencies throughout the recovery process (Berke & Campanella, 2006).

With respect to the dimensions of a recovery plan, there is an emerging call in the recovery literature for paying more attention to social and cultural aspect of recovery rather than focusing only on physical reconstruction. Disaster management policy, as observed in many countries focuses mainly on the physical part of the vulnerability, and

Table III. Codes that identify success criteria for recovery plan

Codes that identify success criteria for recovery plan	# quotes	# articles that discussed this issue/code
recovery plan: dimensions	8	6
recovery plan: information	11	8
recovery plan: mitigation	7	3
recovery plan: special regulations	3	2
recovery plan: troubling	8	1
recovery plan: agreements	15	8
recovery plan: allow public input	1	1
recovery plan: clear priorities	2	2
recovery plan: commitment	3	3
recovery plan: consistent	7	3
recovery plan: direction	5	3
recovery plan: flexible	9	7
recovery plan: implementation	7	3
recovery plan: importance	3	1
recovery plan: needs	4	4
recovery plan: resources	12	9
recovery plan: sustainability	4	3
recovery plan: vision	17	8
recovery plan-land use	2	1

social aspects are often missing. Consequently, the reconstruction plans following major disasters focus mostly on the physical recovery and more visible impacts, and the plans often lack attention to social recovery (Aldrich & Meyer, 2014; Shaw & Goda, 2004).

With respect to preparation of a pre-disaster recovery plan, local governments have used two approaches. One involves preparing a recovery plan as a stand-alone plan. The other entails a recovery plan as one element integrated into a broader comprehensive plan for an entire municipality, county, or region. Each approach has its own advantages and disadvantages with respect to quality. A standalone plan can be easier to revise, has more technical sophistication, is less demanding of coordination, and is simpler to implement. An integrated plan brings more resources together for implementation, broadens the scope of understanding about interactive effects of recovery issues with other local issues (e.g., transportation, housing, land use, environment), and provides access to a wider slate of planning and regulatory tools (Berke & Campanella, 2006).

However the community arrives at the decision to develop its plan, four simple constant factors pervade the process: goals, strategy, priorities, and criteria (FEMA, 2009; Schwab et al., 1998). An essential purpose of the plan for post-disaster recovery and reconstruction is to provide some vision that serves as a beacon for decision-makers, and some framework within which decisions will be taken. Moreover, having goals that are transformative and restorative is the first principal for evaluating the quality of a recovery plan. On the one hand, research shows that uncertainty among local officials regarding pre-and post-disaster goals hinders the overall recovery process. On the other

hand, some researchers warn against overambitious post-reconstruction plans which can lead to unrealistic expectations, bitterness, and disappointment (Haas et al., 1977).

To be sure, it would be foolish to make detailed plans for a recovery before a major event took place – every event is different, and most major events have a high variability in intensity (Leonard & Howitt, 2010). Hence, no plan developed in the pre-disaster period can anticipate the precise nature of the next disaster. But it can provide decision-makers with some general guidance as to the policy objectives their decisions must aim to achieve. This serves to minimize unintended consequences, and to keep the maximum number of players working toward the same ultimate goals. Communities that develop plans for post-disaster recovery and reconstruction can highlight what they regard as their most essential objectives in what is sometimes called a vision statement in other types of plans. The vision statement should be clear but broad in its view of the positive consequences for the community if the plan is properly implemented (FEMA, 2009). The plan should remain open and flexible to change through feedback from the public and specifics of the event (Nakagawa & Shaw, 2004).

Pre-disaster and post-disaster mitigation should be two parts of a seamless whole in a sound plan for the post-disaster recovery and reconstruction (FEMA, 2009). By studying some of the mitigation options before disaster strikes, a community is better prepared for recovery. The recovery plan should precisely document the anticipation of the consequences of a disaster, like potential hurricane paths and wind velocities, in relation to the vulnerability of housing stock, industrial property, and commercial buildings, as a means of identifying the mitigation and recovery strategies and resources

needed to make it happen (FEMA, 2009). Projections should also estimate all possible indirect losses, such as the loss of economic activity, and transportation-related economic losses.

The recovery plan, including associated agreements and policies, can and should emphasize the importance of acting collectively over time, and thereby, optimizing the use of resources (funding, technical assistance, and policy) that the disaster assistance network can provide. As part of the pre-event recovery planning process, members of the assistance network should develop a series of temporarily coordinated pre- and post-disaster actions (Smith, 2011). Examples of such arrangements to be documented in the plan are rules and regulations that might need to be suspended in order to allow rapid rebuilding, a permitting mechanism that is designed to be nimble in the aftermath, financial arrangements that would facilitate access to resources after an event, ans experiences of local leadership groups in organizing their neighborhoods that can be applied in the aftermath of a disaster (Leonard & Howitt, 2010).

Focusing on the details of implementation is at the heart of preparing the elements of the plan for long-term post-disaster reconstruction (FEMA, 2009). For example, to address the issue of nonconforming uses after a disaster, in a way that long term recovery goals are not compromised and reconstruction is not hindered, the recovery plan should establish clear criteria for allowing the reestablishment of nonconforming uses under disaster-related circumstances (FEMA, 2009; Schwab et al., 1998).

Federal recovery policy

Recovery planning practice by local governments, particularly following large disasters, can be influenced and guided by the federal policies and programs which regulate and provide expertise, technical, and financial assistance in the aftermath of federally declared disasters. Federal policy for recovery planning was formally developed by National Response Plan (NRP), Emergency Support Function 14 (ESF#14) in 2004. Prior to that, the federal government had provided planning and policy-based recovery and redevelopment assistance, focused on regional and community-wide recovery planning and interagency coordination in large, multi-state, or unique disasters. Drawing on these experiences, ESF #14 was created to promote a community-centric, coordinated, and long-term approach to recovery, with a focus on organizing and leveraging federal resources and providing enhanced technical assistance to states and communities.

The NRP was superseded in 2008 by the current National Response Framework (NRF), which further outlines the mission and role of ESF #14. ESF#14 LTCR assistance was activated for a presidentially declared disaster at the request of a Federal Coordinating Officer in coordination with local officials. The mission of LTCR was to help the impacted communities to identify and coordinate significant recovery resources, undertake impact analyses, facilitate the organization and coordination of recovery partners and stakeholders, identify recovery needs and opportunities for collaboration and support, and support launching community recovery plans (Rozario, 2001).

LTCR planning is action-oriented and should support existing planning efforts in the community. The final outcome of this support is a list of projects with specified priorities that should lead the communities' recovery. Determining priorities in achievements plays an important role in the community's perception of LTCR's success. (FEMA, 2005). The key principles of LTCR are intended to assure community recovery is:

- Community driven
- Based on public involvement
- Locally controlled
- Project-oriented
- Incorporates mitigation approaches and techniques
- A partnership among local agencies, jurisdictions, officials, and the state and federal government
- Focused on projects that most contribute to community recovery from the disaster (FEMA, 2005)

LTCR program was designed to help communities manage their recovery process without a pre-disaster recovery plan, therefore, it has a very practical and outcome oriented approach. LTCR support could include:

- Providing advisors and subject matter experts for consultation
- Facilitating key community leadership meetings
- Advising on public engagement

- Providing full planning teams to work on-site within the community to help facilitate all steps in the process.

Technical assistance provided for recovery planning by LTCR was tailored to the unique conditions, disaster impacts, and needs of the community. Other than being project-oriented, all other key principles of LTRC were echoed in the literature. LTCR also intended to respond to the community's capacity, helping to develop a coherent strategy in a timely manner, engaging the public, and building partnerships to create an environment for successful recovery. Generally, the LTCR planning activities should be initiated 4 to 8 weeks after a disaster, and be completed within 6 to 12 weeks depending on the severity of the damages and the resources. The 6 to 12 weeks timeframe does not seem to be a reasonable time for developing a coherent recovery strategy, engaging the public, and building partnerships even in a timely manner. The typical LTCR steps are:

Step 1: assessing the need for long-term community recovery planning

Step 2: selecting the leader and design of LTCR process

Step 3: securing outside support

Step 4: establishing a community involvement campaign

Step 5: reaching consensus and obtain buy-in

Step 6: identifying issues and opportunities

Step 7: setting the vision and goals

Step 8: identifying, evaluating and prioritizing projects

Step 9: developing a recovery plan

Step 10: choosing projects' champions

Step 11: preparing a funding strategy for projects

Step 12: implementing the plan

Step 13: updating the plan

In such short timeframe, reaching some of the steps above seem very difficult, if not impossible, as documented in a number of cases reviewed by Government Accountability Office (GAO, 2010). Even though LTCR program was designed based on the premise that taking the time to move through its process allows the community to make the most of the opportunities created by the recovery process, there was not enough time and capacity for deliberation, consensus building, and sound information analysis under the LTCR program.

LTCR continued to evolve until 2011 when its work helped catalyze the development of the National Disaster Recovery Framework (NDRF). As NDRF was implemented and Recovery Support Functions (RSFs) were developed, ESF #14 transitioned to the Community Planning Capacity Building RSF. Like NRF, NDRF governs interactions of various governmental and non-governmental recovery partners and private sector for all types of disasters. NDRF aligns with NRF, which since 2011, primarily addresses actions during disaster response. NDRF replaces NRF Emergency Support Function #14 - Long-Term Community Recovery. Key ESF #14 concepts are expanded in NDRF include recovery-specific leadership, organizational structure, planning guidance and other components needed to coordinate continuing recovery support to individuals, businesses and communities (Guidry, 2014).

RSFs comprise NDRF's coordinating structure for key functional areas of assistance. RSFs are organized into six manageable components, and through RSFs, relevant stakeholders and experts are brought together during steady-state planning and when activated post-disaster to identify and resolve recovery challenges (Guidry, 2014).

NDRF marks a shift in federal recovery policy toward putting more emphasis on pre-disaster recovery planning and building capacity for recovery in communities. The mission of the Community Planning and Capacity Building RSF, which is the first RSF, is supporting and building recovery capacities and community planning resources of local, state, and tribal governments needed to effectively plan for, manage and implement disaster recovery activities in large, unique or catastrophic incidents.

NDRF's approach to recovery planning is more proactive and mitigation-oriented than NRF ESF#14. It aims to coordinate the provision of preparedness planning and technical assistance support to aid tribes, states and local governments to develop effective pre-disaster recovery plans that guide the full range of recovery efforts, both short- and long-term, and ensure all affected populations are included. Community Planning and Capacity Building RSF has an emphasis on integration of hazard mitigation throughout the continuum of pre- and post-disaster recovery planning and implementation. The Community Planning and Capacity Building RSF also serves as a forum for helping to integrate the nongovernmental and private sector resources into public sector recovery planning processes. NDRF has changed the time frame of planning too: Whereas ESFs typically operate within a time span of weeks and months, Community Planning and Capacity Building RSF operational timeframe is months to

years. RSFs will likely activate before all ESFs demobilize; therefore, they may coexist within the same operation for a period of time. Neither ESFs nor RSFs have a predetermined point at which they demobilize.

NDRF Community Planning and Capacity Building RSF describes key principles and steps for community recovery planning . It recognizes that local, state and tribal governments have primary responsibility for the recovery of their communities, and play the lead role in planning for and managing all aspects of community recovery. The pre-disaster planning guidelines emphasize that all stakeholders should be involved to ensure a coordinated and comprehensive planning process, and develop relationships that increase post-disaster collaboration and unified decision-making. Another important objective of pre-disaster recovery planning in NDRF is to take actions that will significantly reduce disaster impacts through disaster-resilient building practices. NDRF strongly encourages innovation among the states, tribes, localities, and the private sector in working together to identify state, tribal and locally generated tools and resources, pre-disaster, that will serve to support and sustain disaster mitigation and recovery efforts (FEMA, 2011).

NDRF has also a stronger emphasis on making recovery planning inclusive and transparent, aimed at advancing resilience. It is critical that disaster recovery officials recognize the importance of partnership, and create coordination opportunities during pre-disaster planning with private sector leaders. The resources and capabilities of the private-sector, including utilities, banks, and insurance companies, can play an important role in encouraging mitigation and creating greater resilience in a community.

Community Planning and Capacity Building RSF unifies and coordinates expertise and assistance programs from across the Federal Government to aid in restoring and improving the ability of tribes, states and local governments to organize, plan, manage, and implement recovery (FEMA, 2011). NDRF incorporates an integrative approach to recovery planning. It integrates mitigation, recovery, and other pre-disaster plans and activities into existing local, state and tribal community-wide planning and development activities, such as comprehensive plans, land use plans, economic development plans, affordable housing plans, zoning ordinances and other development regulations through technical assistance.

ESF14's approach to designing the process was more prescriptive with a number of steps; however, NDRF is more flexible by stating that each community determines its own process. NDRF only suggests some elements, modified from LTCR planning process, to consider for designing the planning process. Each community determines its own process for post disaster recovery planning.

Improving federal recovery policy

Reviews of the federal recovery policy raise three major issues: first, federal government has provided limited support for proactive recovery planning. Second, the design of the federal recovery planning support has been prescriptive, and can limit creativity at the local level. Third, the federal recovery planning policy does not facilitate incorporating long-term development and disaster resilience into recovery planning.

ESF #14 LTCR has worked with more than 180 communities across the Nation since it officially became an Emergency Support Function in late 2004. As a result, some

90 community recovery plans, strategies or documents were produced, 18 local community recovery organizations were formed, and assistance was provided to 11 states to organize for recovery (FEMA, 2005; GAO, 2010). LTCR program is intended to improve coordination among federal agencies' programs and help communities to develop post-disaster recovery plans. However, while it represents a first step toward the adoption of recovery planning procedures, it has been troubled by a lack of support with the FEMA and limited understanding among federal and state agencies' staff in the field after a disaster (Smith, 2011; Smith & Birkland, 2012).

The lack of locally derived and clearly defined goals and objectives might hinder recovery efforts because sometimes local governments perceive that they have a limited set of options (Smith, 2011). It is reported that most of the ESF#14 personnel deployed after a major federally declared disaster are private sector contractors from outside the community, and although many of them are practicing planners, they may have little or no experience in the post-disaster environments, especially in the local context of the disaster-stricken communities.

The federal planning support might provide both expertise in planning and experience with disasters but still fall short in obtaining support for the plan. Planning consultants that FEMA sends to communities to support recovery planning efforts are often unfamiliar with local power dynamics, pre-existing problems, or social and cultural fabric of the community. They offer planning resources and expertise but simply do not know very well the people with and for whom they are working. Without reflecting and considering social and power dynamics, it is suggested that the resulting plan can gain

limited support and chance of implementation, and may fall short of directing long-term development and resilience.

Since the LTCR program is triggered by a federal disaster declaration, LTCR personnel are sent to help states and local governments create post-impact recovery plans. The limited investment of resources in pre-event capacity-building strategies, including planning and alternative dispute resolution techniques, results in a greater dependence on federal funding when a major disaster occurs. Moreover, communities are less prepared for smaller events that do not merit federal assistance given that they have not engaged in a meaningful pre-event planning process, and thus, lack an understanding of both local needs that may emerge and limitations of the disaster assistance framework to meet them. They do not have an incentive to proactively address pre-event planning for post-disaster recovery as the federal government has provided increased levels of assistance following disasters over time, especially in areas subject to repeated events (Smith, 2011). Consequently, narrowly defined recovery programs, over-reliance on disaster programs, and low capability and commitment impede sustainable disaster recovery (Johnson & Hayashi, 2012).

If federal funding supports and encourages pre-impact recovery planning, the amount of funds needed to recover decreases, and consequently, dependence on federal post-impact recovery funding decreases as well; because by pre-disaster recovery planning _especially if it is integrated with mitigation planning_ communities can reduce the damage in several ways: by studying their vulnerabilities and vulnerable populations, and predicting the losses due to the vulnerabilities they can prepare for. For example

they can prioritize and invest in reinforcing vulnerable structures, which probably costs less than repairing or rebuilding after the disaster.

Even if pre-impact recovery planning is not integrated with mitigation planning, it can potentially reduce the cost of recovery. For example, confusion around changing responsibilities and resources of various agencies, regulations associated with federal assistance programs, etc. are suggested to make recovery slow and inefficient. Recovery planners can predict and reduce post-disaster confusions to make recovery more efficient by designing and establishing a communication procedure for sharing knowledge and information. Citizens and organizations can trust and become comfortable with using such communication procedure through pre-disaster exercises. Hence, investing in planning and preparation activities would most probably reduce the wastes of public assistance that is provided after the event, even if it does not reduce the amount of needed public assistance. Moreover, since the aftermath of every disaster is a prelude to the next one, investing in recovery planning pre- and post-disaster would help improve resilience, and consequently, costs associated with damages from the next disaster in a longer time frame.

Limited pre-event expenditure on capacity building techniques, including plan making, public participation, and facilitated policy dialogue among members of the assistance network degrades the effective use of recovery funding for the creation of the coherent recovery strategy (Nelson et al., 2007). Federal disaster policy has long neglected the steps that could be taken in advance to make recovery quicker, less expensive, or more complete. Federal policies have emphasized risk reduction (e.g.,

seawalls, dams, and levees) and risk-sharing strategies (e.g., disaster relief payments, income tax write-offs for lost property, and subsidized flood insurance) rather than risk avoidance strategies that involve land use. These strategies discourage local governments to adopt local controls on development in hazardous areas that could prevent destruction (Burby et al., 1999). Recovery and actions to support recovery, like planning and community mobilization, are understood to take place after the fact. Traditional recovery discussions, thus, focus on one set of actions (rehabilitation and reconstruction) and on one time period (after the event) (Leonard & Howitt, 2010).

There is an emerging consensus among disaster scholars that one of the premises of an improved disaster recovery assistance framework is an increased emphasis on planning for disaster recovery. But it is suggested that the current disaster recovery assistance framework does not encourage such an approach. Most disaster recovery training and educational programs are conducted on an ad hoc basis, and focus on the administration of federal programs rather than on a collaboratively designed, locally tailored training agenda that emphasizes a long-term commitment to capacity building for planning (Smith, 2011). In my discussion of NDRF, I noted the improvements made into Community Planning Capacity Building RSF to address this need for a proactive recovery planning approach. While FEMA is the responsible agency for the planning RSF, no agency appears to have an extensive mandate to invest in advance recovery planning.

Disaster recovery is sometimes understated by communities as the pursuit, distribution, and management of financial resources (Friesema, 1979). This approach has

resulted in skewed metrics of success and recovery outcomes that are shaped by largely prescriptive grant programs that do not meet local needs, and are inappropriately timed. The reason for these policy failures include the lack of preparedness planning in state and local governments, and failure of the federal government to support such planning (Birkland & Waterman, 2008; Smith & Birkland, 2012).

It is suggested that the current emphasis on the delivery of post disaster grant programs and the weak commitment to build collective capacity to plan for recovery has marginalized the role of practicing planners in recovery. This reactive approach has led to spending too much on response to and recovery from events that local, state and federal governments should have instead figured out how to prevent or mitigate. Recoveries are generally slower than they should be, exacerbating social losses; because the necessary or useful infrastructure for rapid recovery are not created in advance (Leonard & Howitt, 2010). Creating and maintaining recovery and mitigation infrastructure in advance is a shared responsibility among federal, state and local governments.

Reactive decisions with narrow focus may fail to protect against actions that may not be in the community's best interests; actions such as attempts to derive short-term profits through redevelopment practices that result in an inequitable distribution of outcomes, and the equation of success with the speed of recovery rather than with a more deliberative approach that reflects pre-and post-disaster social, economic, and environmental conditions. Hence, federal recovery policy can potentially help to prevent

some of the adverse consequences of reactive recovery decisions of local communities through encouraging a proactive approach by local governments.

To encourage local governments to engage in pre-disaster recovery planning, Berke et al. (2006) suggest that federal recovery policy should make increased and sustained investments in pre-event aid contingent upon increased accountability of local governments for pre-and post-disaster planning and preparation. Given that any community in the United States will demand aid in an emergency, the federal government should also require every community to produce a meaningful performance-based mitigation and recovery plan.

Implications of the above comments can be summarized as three suggested alterations in Federal recovery policy. First, the planning support should move from the reactive approach in LTCR and NRF to a proactive approach that provides incentives and support to communities and local governments for engaging in pre-disaster recovery planning. This shift can help to reduce dependency and high cost of recovery assistance in the aftermath. Second, the federal recovery policy should provide planning support in a bottom-up manner respecting the local needs, value, priorities and internal power dynamics. Third, federal recovery policy should build planning capacity in local government and local community level in such a way that they can address long-term community goals through disaster recovery planning.

CHAPTER III

2ND ARTICLE: RECOVERY PLANNING AFTER HURRICANE IKE: GALVESTON, TX

Introduction

Recovery planning is gaining more attention from disaster and planning researchers, especially since the widespread critique of the post-Katrina's planning process. There is a general consensus on the value of planning for disaster recovery (Johnson & Hayashi, 2012; Olshansky, 2005b; Smith, 2011; Smith & Birkland, 2012). This emerging consensus is mainly based upon several case studies in the United States (Schwab et al., 1998; Spangle, 1986), and abroad (Berke & Beatley, 1997; Bolin & Bolton, 1983; Oliver-Smith, 1990), which suggest some of the possibilities in recovery planning. Through planning, communities can potentially increase the opportunities in recovery for coordination of land uses and infrastructure, and promote physical designs that will improve the quality of residents' lives, account for the concerns of all citizens, and seek cost-effective solutions (Olshansky, 2005a). It is also suggested that planning for post-disaster recovery can help establish critical priorities and objectives, traceable milestones, essential leadership, and community commitment for recovery (Olshansky, 2006; Schwab et al., 1998).

While disaster scholars emphasize the need for long-term disaster recovery planning, few studies (Rubin et al., 1985) have explored the experiences and challenges of post-impact recovery planning, particularly in smaller cities. Hence, research is

needed to increase our understanding of planning processes in the wake of disasters (Kim & Olshansky, 2014). The influences of planning on urban rebuilding and ultimately on community disaster resilience also needs more attention from recovery planning scholars. Such knowledge can help better understand the post-disaster environment, and provide insights to help planners operate more effectively in this world (Berke et al., 2014).

This study attempts to understand the challenges, successes, and failures of recovery planning in Galveston, Texas following Hurricane Ike. Through a qualitative case analysis of Galveston's Long Term Recovery Committee (LTRC) planning process, I inquire whether and how this case informs the literature on recovery planning, and draw applicable lessons for practice in other communities.

Literature Review

A number of case studies that explore post-disaster recovery planning experiences provide insight on elements of success and different ways of overcoming challenges in practice. While lessons from specific cases can only be applied to other disasters with caution, they can provide helpful perspectives and insights. In this section I summarize some of the important findings and lessons learned from the following cases:

- Los Angeles, CA following 1994 Northridge earthquake
- Grand Forks, ND following the 1997 Red River flood
- New Orleans, LA following the 2005 Hurricanes Katrina and Rita
- Kobe, Japan following the 1995 Great Hanshin earthquake

- Watsonville and Oakland following 1989 Loma Prieta Earthquake

Los Angeles benefited from having a citywide pre-event recovery plan, prepared by the Emergency Operations Organization of the City, which was approved by the city Council five days after the Northridge Earthquake (Olshansky, 2005a). The pre-disaster response and recovery planning has been credited as a positive factor in the City's inter-organizational and multi-governmental relationships. There seems to be some evidence that indicate this plan helped to familiarize key city departments with their likely roles and responsibilities, information needs, and funding sources and procedures for obtaining them (Johnson, 2014b; Olshansky et al., 2006). Furthermore, continuing work begun in the pre-earthquake recovery planning process, Los Angeles developed a limited vision of recovery and housing repair program in the first year after the earthquake. The mayor, a recovery committee in the City Council, and the Chief Administrator's Office (CAO), had significant management roles in the recovery (Johnson, 2014a).

The Red River of the North experienced record flooding in late April 1997, devastating the downtowns of Grand Forks, North Dakota, and East Grand Forks, Minnesota, and damaging 83 percent of homes in these communities (GAO, 2009). Following its 1997 flood, the City of Grand Forks adapted the Incident Command System (ICS) structure for its recovery management organization (Olshansky & Johnson, 2014). This may be the first-ever application of ICS in recovery.

Shortly after the April 1997 flood, Grand Forks mayor and city council charged the heads of the city's urban development, public works, and finance departments ("Tri-Chairs for Recovery") with developing priorities for recovery, submitting action steps

for approval, and collectively managing the city's recovery resources. In the first month following the flood, the mayor and these "Tri-Chairs for Recovery" worked together with city staff, elected officials, and local community and business leaders to sketch out a basic vision for recovery focusing on reducing future flood risks and promoting downtown economic development (Johnson, 2014a). By early June, the mayor and tri-chairs, working with federal officials, had formulated a strategic plan for using Community Development Block Grant (CDBG) funds and submitted an application for hazard mitigation grant funds from the FEMA for voluntary buyouts. By late June, Grand Forks leaders, working with a technical assistance team from the U.S. Department of Housing and Urban Development (HUD), had drafted a set of policies and programs in the form of a Recovery Action Plan for the period of June to November 1997 (the "first season of recovery").

Based upon the Recovery Action Plan, the city also conducted weekly action planning sessions modeled after daily situation planning sessions generally performed by emergency responders using the ICS management approach (Johnson, 2014a). Federal and state representatives attended the weekly planning sessions in Grand Forks and many program restrictions and issues were often resolved there. Nonetheless, over the next few years, residents criticized city leaders for relying too heavily on "traditional public participation" techniques such as workshops, Round Tables, and public meetings which often lack a clear structure and aim to the meeting. Consequently, citywide elections in 2000 ousted the mayor and two of the "Tri-Chairs for Recovery" resigned soon after (Kweit & Kweit, 2007). The study by Kweit and Kweit (2007: 421) on

experience of Grand Forks indicated that, "at least for major decisions, officials should make sure that there is a very visible participation process.

Following the devastation by Hurricane Katrina in August 2005, New Orleans went through a protracted planning process that lasted nearly two years to develop a recovery vision and management structure (Kates, Colten, Laska, & Leatherman, 2006; Olshansky et al., 2008). Time had a critical impact on the success and quality of recovery planning in New Orleans. On the one hand, unanticipated resident distrust of government and professionals and the failure of city officials to designate quickly a single agency with the authority to guide a comprehensive recovery planning process slowed the development of a citywide rebuilding strategy (Nelson et al., 2007). Olshansky et al. (2008) suggested that the city administration could have taken a more active leadership role in planning and information management earlier (Olshansky et al., 2008). On the other hand, groups of planners were in a rush to develop multiple plans quickly, partially because there was not an officially designated New Orleans plan sanctioned by the local government. Planning and decision processes were constrained by the speed of information flows. Most of the planning processes kept moving ahead without adequate information about what others were doing and even in the face of discord (Colten, 2008). Researchers point out that had the planners who came to New Orleans not felt so compelled to complete recovery plans quickly, they might have been more effective at providing reasoned analysis over time to support community actions and engaging a broader public in resolving difficult questions of restoration versus betterment through deliberative planning (Nelson et al., 2007; Olshansky et al., 2008).

Limited planning capacity introduced a set of challenges for post-Katrina planning efforts. In New Orleans, the city's planning department was cut for financial reasons at a time when increased capacity was needed. It is suggested that reducing the city's planning capacity undermined its ability to apply existing institutional resources to the challenges of post-Katrina reconstruction (Olshansky et al., 2008). The City had to rely on technical assistance from consultants both inside and outside the disaster area.

In the spring of 2006, and after three major and multiple smaller planning processes had either failed or were not recognized by the city government and a full xx months after Hurricane Katrina hit the area, the Greater New Orleans Foundation started the Unified New Orleans Plan process in an attempt to avoid the pitfalls of previous plans. Consequently, given the tight four-month timeframe of the UNOP process, the planning teams designed the process with a series of citywide and district-level planning meetings that simultaneously provided input on key elements of the plan development process, and set expectations for the next phase in the process (Olshansky & Johnson, 2010). By pivoting between city-level and district-level discussions, the series of meetings essentially served as critical focusing, validation, and hand-off points for the simultaneous citywide and district planning efforts.

After the 1995 Kobe earthquake, the long-term recovery process began with the formulation of disaster recovery plans by the City of Kobe – the most severely impacted municipality – and an overarching plan by Hyogo Prefecture which coordinated 20 impacted municipalities; this planning effort took six months.

In six months, Kobe had a 3-year housing reconstruction plan approved, and began the neighborhood planning processes. Planning consultants were hired by the local government to work with neighborhood groups. These consulting planners were involved throughout the planning process to negotiate the complex agreements needed to implement the plans. They also helped to shape ideas for recovery, and brought government and ordinary people together (Olshansky et al., 2006).

The City of Kobe's recovery plan is, in large part, an adaptation of the 1995-2005 general plan. On January 13 of 1995, the City of Kobe formally approved its new, 1995-2005 general plan which had been developed over the course of three years with full citizen participation. City officials responsible for drafting the City of Kobe's recovery plan have later admitted that they were able to prepare the city's recovery plan in six months because they had the preceding three years of planning for the new general plan with citizen participation before the Earthquake. In addition, the two-month moratorium on rebuilding in Kobe city provided time for the city to formulate a vision and policies to guide the various levels of government, private investors, and residents in rebuilding. Having numerical targets was critical to directing and motivating all the stakeholders including the national government's investment, and it proved to be the foundation for Japan's fundamental approach to recovery following the 1995 earthquake (Charmaz, 2006).

After the 1989 Loma Prieta Earthquake in Watsonville and Oakland, planning evolved from weekly staff meetings, prior plans and practices, and key policy decisions made along the way. Neither Watsonville nor Oakland developed a comprehensive

recovery plan as it would be expected in a rational process. Instead, community leaders were proactive, organized several meetings, and had positive attitudes which according to Johnson (1999) were contributed to the success of recovery. In addition, both cities benefited from public-private partnerships that emerged after the earthquake and helped to provide community forums and develop consensus (Johnson, 2014a). Managers in both cities also lamented the lack of time to create a vision for recovery and systematically define priorities (Johnson, 1999).

The lessons for recovery planning based on the brief discussions of the findings of previous studies can be summarized under four major themes including time, resources, inclusion, and local leadership.

Time: All of the recovery planning studies found a dilemma between the need to plan quickly to provide the community with a vision to proceed, and the time necessary for deliberation before making decisions with long lasting effects. Taking the time to plan for post-disaster reconstruction when adequate information becomes available is important, in order to make the new 'permanent' city, based on sound data that inform analysis. But, if planning takes too long, it will be ineffective or simply too late to be put in to effect. Olshansky et al. (2008) suggest that planning and action should be considered as simultaneous activities, so that deliberation can occur without halting vital recovery actions (Olshansky et al., 2008). Time also introduces a dilemma between short-term and long-term planning. Eadie (1998) warns planners that it is difficult for staff to balance both long-term recovery planning and short-term urgent activities like expedited permit processing (Schwab et al., 1998). Smith and Deyle (1998) propose that

communities should emphasize a distinction between planning for short-term and long-term recovery to reduce community mistrust of long-term planning as being intrusive and make it easier for planners to participate in the important activities of short-term recovery such as permit processing that can have long term consequences for the community.

Local leadership: Innovative, proactive, and committed local leadership has been suggested to be one of the important if not critical resources for recovery planning. Post-disaster recovery is not a rational process that can proceed from a checklist, therefore local leaders and planners should be prepared to alter and adopt recovery planning guidelines based on their specific needs. Recovery after large disasters involves multiple plans by multiple actors. Alesch et al. (2009) describe effective post-disaster planning as balancing different directions at various junctures, depending on how things are going. Recovery planning should be led by local governments and assisted by state and federal governments. Of all levels of governments, local governments have the greatest knowledge of the situation and history of the locale, potential experience in integrating citizen and business input into local planning and visioning processes, and providing information for citizen and business decision-making (Johnson, 1999). Well organized and economically strong local governments with good leadership, knowledge, and the power to act have been found to promote successful community recovery (Dash et al., 1997).

Resources including financial, information and expertise: Olshansky et al. (2005) suggest that post-disaster planning – to be fast, effective, equitable, and provide some

improvements over pre-disaster conditions – requires well-funded planning processes, rich in information and communication. The effectiveness of recovery planning is driven by the information used to establish policy and spur action. Information systems that include inventories of parcels, structures, and hazards can greatly facilitate the recovery process (Olshansky, 2006). Specific information needed to develop a recovery plan includes hazard characteristics and impacted areas; damage assessment; local needs assessment; affected population size, composition, and distribution; resources available; powers, programs, and responsibilities of local, state, and federal governments as well as nonprofits, businesses, and other relevant stakeholder organizations; current and projected land-use patterns; the type and location of existing and projected building stock and infrastructure, including its interconnectivity to existing and projected development (Mileti, 1999).

Disaster management information systems, particularly databases, interdepartmental networking, and geographic information systems (GIS), should be integral to local recovery planning and decision-making. Tran (2008) identifies the contributions of GIS, integrated computer software, data warehousing, automated budgeting systems, and citizen relationship management programs—that aggregate and disseminate information to residents on behalf of the city. All of these are critical resources for local recovery planning, management, and decision-making (Tran et al., 2008).

Outside technical assistance (with disaster experience) is another critical resource which should be used to augment local staff, especially when staff is unfamiliar with

disasters and disaster regulatory compliance (Alesch et al. 2009). Local governments typically augment their post-disaster staffing capacity to help with evaluating and assessing the disaster consequences, in devising and evaluating recovery strategies and programs, managing programs that involve several agencies, and coordinating with granting agencies (Johnson 1999; Schwab 1998). Some communities, as discussed above, have hired consultants to provide recovery expertise; others have turned to academics and volunteers, especially in post-disaster recovery planning and community design (Johnson, 2014).

Inclusion: Local, citizen-based processes for making and reviewing recovery decisions are essential to the success of recovery (Berke, Kartez, & Wenger, 1993; Haas, Kates, & Bowden, 1977; Johnson, 1999; Olshansky, 2005; Rubin, Saperstein, & Burby, 1985; Schwab, 1998). Stakeholders who will be affected by post-disaster decision making should provide input and policymakers should obtain buy-in from them. This will reduce conflict and aid in the development of a plan that reflects local needs. Berke and Campanella (2006) argue that to improve disaster recovery planning and advance more resilient communities, the federal government should require that communities take citizen participation seriously.

Study Area

City of Galveston was incorporated in 1839 and was one of the major cities of Texas and largest ports in the United States during 19th century. The devastating Hurricane in 1900, the deadliest in American History, and frequent hurricanes have tied this barrier island to natural disasters. The major economic activities of the city current

include the port of Galveston and related maritime interests, tourism, financial and insurance institutions, and the island's largest employer, the University of Texas Medical Branch at Galveston (UTMB). Galveston has been experiencing population decline since 1960s. Ike made landfall near Galveston as a strong Category 2 hurricane, on September 13, 2008 and 75% of the structures on the island received some degree of damage primarily from surge. Almost every resident on the island was was affected in one way or another.

While many Galvestonians were unprepared for the strength Hurricane Ike and the depths of the surge, its threat was sensed prior to the storm. In August 2008, Tropical Storm Eduardo provided what some called the City's "dress rehearsal" for preparing an emergency response. During a city council meeting in August 2008, the late council member, Danny Weber, announced during deliberations over beach re-nourishment that the buffering effects of sand deposits guard against the encroachment of storm surge from the next major hurricane to hit Galveston, "not if, but when" (Glaser, 1992).

Galveston was equipped with a number of disaster related plans prior to Ike. After seeing the extent of damage brought by Hurricane Katrina and Hurricane Rita, local leaders created a Disaster Response for Historic Properties Plan as well as a comprehensive plan update, complete with a disaster planning element. Unfortunately, the comprehensive plan update was two weeks out from adoption when Hurricane Ike hit. Although a hazard-specific plan for the city was not in place, recovery planning following Ike saw a remarkable resident participation.

The Galveston City Council initiated the recovery planning process two months after Hurricane Ike with the first appointments to the Galveston Long-Term Recovery Committee (LTRC). Galvestonians formed an especially large recovery committee with 330 members which is exceptional in terms of public involvement for post-disaster recovery planning. FEMA's Long-Term Community Recovery (LTCR) program, which provides support to local recovery planning efforts, was also involved in the planning process.

Methodology

Qualitative analysis was conducted on data collected through semi-structured interviews as well as secondary data including media reports and public documents. In general, the goals of this analysis are to understand how Galveston's post-Ike recovery planning process took place and progressed, as well as strengths and weaknesses that emerged during that planning process. Another goal for my qualitative analysis is to examine whether or not the case of planning in Galveston informs further the issues that emerged in the first article and what does it add to our knowledge of challenges in recovery planning as well as how to improve it.

Data sources

This research was based on qualitative semi-structured interviews. I conducted formal and semi-structured interviewing with and initial sample of institutional actors whom I initially identified through articles and a guest columns in the *Galveston County Daily News* and other sources discussed below and then employed a snowball sampling technique to expand the sample. I also engaged in numerous informal conversations that

were converted into field notes after the fact. The qualitative interview data and field notes were further supplemented by relevant information gleaned as I collected media content and formal meeting agendas and minutes from Galveston City Council and the Galveston Long-term Recovery Committee.

I used several other sources of data to keep track of the recovery debates and events as the case unfolds. I analyzed official documents of governmental, quasi-governmental, and non-profit agencies involved in recovery planning; including the Galveston Long-term Disaster Recovery Plan document, minutes, meeting and workshops agendas (from FEMA's Long-Term Community Recovery team which helped Galveston with preparing the long-term recovery plan). I also used popular data sources that include newspaper and other forms of media reporting like blog posts and documentaries.

Sample of interviewees

Newspapers, website information and personal connections through the university and previous research activities were used to identify local organizations and individuals involved in the recovery planning and policy making. Interviewees were selected based on the importance of their role in the course of decision making and managing the recovery process in Galveston. For example, individuals who were frequently cited in the media reports and debates about the recovery related issues in Galveston including housing recovery program, business recovery, long-term community recovery, mitigation planning, etc. were contacted and interviewed.

I used an emergent snowball sampling design which cannot be drawn in advance (Lincoln & Guba, 1985; Phillips, 2014). The fieldwork process reveals the next participant, site or document that is needed to be sampled (Biernacki & Waldorf, 1981). In this method each person interviewed is asked to recommend another person who can also shed light on the research question until reaching the point of theoretical saturation (Lincoln and Guba, 1985; in Phillips, 2014).

Data collection: interview guide

The set of questions in my interview guide were open-ended to give the opportunity to informants to share information and express viewpoints without being restricted by the interviewer. Answers they provide to these questions often yielded interesting and important insights that were then followed up on by the interviewer using probes to stimulate further insights and information. The general areas of inquiry in my interviews were Hurricane impact, community's post-Ike recovery experience, and the informant's role in post-Ike recovery management, recovery planning and policy making, evaluation of recovery planning and policy making and its inclusiveness, evaluation of recovery outcomes. For the complete interview guide see Appendix 3.

From May through September 2012, I conducted 18 interviews in Galveston. Interviewees represented six city officials (elected or appointed), and personnel from three local government agencies including planning department, two local non-governmental agencies, two local nonprofits, three churches and charities and two universities. The interviews lasted between 45 minutes to 2 hours, and were conducted at the place of the interviewees choosing, most often interviewee's office. I conducted all

of the interviews. All interviews were audio recorded and all of them have been transcribed verbatim for analysis. Immediately following the interview, detailed notes were written about the interview and uploaded for analysis.

Analysis strategies

All transcribed interviews, meeting agendas and minutes, Long-term Recovery Plan document, fieldnotes, newspaper articles and blog posts were uploaded into Atlas.ti for qualitative analysis. Qualitative data analysis involves reducing massive amounts of data and moving toward deeper, richer, and more nuanced insights, generating increasingly focused understanding of the social setting and its cultural elements (Phillips, 2014). I coded my data using grounded theory technique. Coding is the process of applying a shortened name or phrase to a portion of data within transcripts, notes, documents, or even visual images. According to Phillips (2014) the most commonly used approach within qualitative disaster research is grounded theory.

Glaser and Strauss (1967) created a systematic approach to generating theory from qualitative data, though ultimately each author went to separate directions (Glaser, 1992; Strauss & Corbin, 1998). Their qualitative explanations emanated from systematic efforts grounded in coding the data. Grounded theory begins by analyzing data as they are gathered, and by comparing bits of information systematically to discern similarities and differences. The coding process then proceeds to move the researcher from general insights to increasingly specific foci, honing in on and understanding the core concept embedded in people's stories. Doing so requires the analyst to read, read, and then read again the interview transcripts, observation notes, or research documents. The ultimate

goals include “parsimony and scope”, two essential elements of good scientific work. Parsimony means you can encapsulate content efficiently, perhaps within a single concept and scope means that you can account for wider amount of data.

Descriptive analysis (coding)

Several authors describe coding qualitative data analysis as a process that consists of at least two stages: descriptive and conceptual (Bazeley, 2009; Bazeley & Richards, 2000; Charmaz, 2006). First-stage includes first cycle and second cycle of coding. First cycle of coding consists of noticing and collecting ideas in the first round of coding on only part of the data material (Saldana, 2009). I started by open-coding five of my interviews and ten of my newspaper articles. In open coding, initially I was generating lots of new codes, then I started to reuse more and more of the codes that I already had until I reached the first saturation point.

At that point, I started the second cycle of coding by reviewing my codes and developing a coding system. My objective at this step was to push my codes from a descriptive to a conceptual, more abstract level. According to Corbin and Straus (1998) analysts need to start early in the analytical process differentiating lower-level explanatory concepts from the larger ideas or higher-level concepts that seem to unite them. Saldana (2009: 149) suggests that the main goal of second cycle coding should be to develop a sense of categorical, thematic, conceptual, and/or theoretical organization from the array of first cycle codes. Hence, I started developing my codes into categories and subcategories.

I merged all codes with the same name or meaning. On the one hand, I had codes that had different labels but were similar in meaning and could fit together under one code. For example I had several codes denoting strong community engagement in the Long-Term Recovery Committee. I merged all of those codes under LTRC_ community involvement. On the other hand, I created more abstract category names that contain no data but provide a common label for the subcategories united underneath.

I developed subcategories in my data to achieve a good description of heterogeneity and variance in the data material. In principal, two approaches can be used for developing subcategories: subcategories can be developed based on previous knowledge (known aspects from the theoretical literature), or found empirically on the basis of the data material (Friese, 2012). I used the second approach. For example, I broke the category "housing program challenges" to HOUSING PROGRAM_ regulation changes, HOUSING PROGRAM_ duplication of benefits, etc.

Sorting and structuring the codes prepared them for the next level of the analysis, where I began to look for relations and patterns in the data with the ultimate aim of integrating all findings to tell a coherent story. During the second stage coding, I applied the structured code list to the rest of the data which allowed me to alter the developed categories and suggested some missing aspects to look for. I ended up with 136 codes, 17 categories and 56 subcategories to describe my data. Appendix 4 presents the coding system I developed. This coding system provided me with an overview of what is in the data. Moving on to the analysis step, I started more reflection through querying my codes, writing memos and making diagrams.

Conceptual analysis

I created research question memos and theory memos to organize the conceptual analysis. Memos like codes are containers: code containers collect quotations, memo containers collect ideas. Theory memos were used to add information from relevant literature, main theoretical concepts, etc. serving as reminders. These memos helped to gather empirical evidence in the data material for theories proposed in the literature.

Research question memos were used to develop my interpretations in response to the research questions in a systematic way. While I entered the study with a number of questions, systematic writing and development of these memos occurred after coding. I developed several research question memos, one for each research question and sub-question. Memos are working and living documents. When an analyst sits down to write a memo, a certain level of analysis should occur (Corbin & Strauss, 2008).

Having research question memos helped me approach the data analysis in a systematic way by formulating precise queries for each question. At this stage I used the Query tool, Code Cooccurrence Explorer (similar to cross-tabulation in quantitative statistical analysis) and the Codes-Primary-Documents Table (similar to creating a correlation matrix in quantitative statistical analysis) to find relations and patterns in my data. Research memos played a major role in this analytical process where I wrote down my thoughts on data as descriptions, interpretations, or ideas for further question ns and queries (Bazeley and Richards, 2000).

The Query tool can process complex queries by combining codes in different ways, more specifically through fourteen (14) distinctive operators. Queries are

formulated using the principle of reverse Polish notation (RPN) that all arguments (codes or code families) are written first, followed by an operator. For a comprehensive view of research memos with data queries used in this analysis see Appendix 5 of the dissertation.

The output of memos became the building blocks of my findings section. Using memo outputs adds transparency to the analysis by enabling others to rerun the queries that led to my answers to the research questions. It is expected to add to the analysis in terms of trustworthiness, credibility, transparency and dependability (Friese, 2012: 146).

Results

Looking back at their post-Ike planning experiences after four years, my study informants discussed their insights and challenges in recovery planning and what they would want or do differently if a similar event occurred. All informants emphasized need for planning before the disaster and more deliberation and conflict resolution in the planning process.

Recovery planning process by LTRC

I start my discussion of LTRC planning process by asking when LTRC planning started, who started it and how. Communities with federal disaster declaration have to produce a long-term recovery plan according to the Emergency Support Function 14 in the National Response Framework to decide how to spend the federal recovery funds.

Starting the planning process: When? Who? How?

FEMA wanted to start ESF14 process in less than a month after Hurricane Ike which had hit in September 2008, but the City government officials felt unprepared to

start planning because they were still dealing, day to day, with overwhelming amount of response and initial recovery related tasks such as issuing permits. The permitting process which occupied so much time and effort from the Planning Department in the first months following Ike, was perceived as a long and difficult process by some homeowners. At a Town Hall meeting with residents in October one speaker from the planning department countered anticipated criticisms of time delays when she began by stating:

> *"I want to start with a few numbers compared to what we normally give out. We have a temporary site at the Justice Center. Yes, the lines are long. We appreciate your continued patience. Keep in mind we average 500 permits per month. As of today since September 22, we've issued 2900 permits: 1600 for electrical; 80 for commercial, 863 for residential repair*" (Quoted in Lord, 2011).

The perception of incompetence within the planning department, mixed with a general sense of post-Ike frustration, was one of the most recurring criticisms by residents following the storm. Reflecting on these perceptions about the post-Ike permitting process, one local planner said:

> *"If you go from your annual number permits to that being in a monthly, nobody is prepared for that kind of volume. Even though we were as well prepared as we could have been we certainly couldn't be prepared for that volume and people have long memories."*

From local planners' perspective, planning for long-term recovery was not a major priority in the first few weeks following Ike but FEMA had a different perspective. Looking back at that immediate post-storm situation, another planner told me she thought FEMA was putting the city in a rush to start strategic planning for recovery when they were not ready:

> *"There was sort of a pressure for the city to engage that process very early on and we were still dealing with very basic issues, we were not even in our offices utility and we were very much trying to be the support function for people getting their permits to get back to their structures."*

However, previous case studies such as Grand Forks, North Dakota following the 1997 Red River floods have shown the value of starting strategic recovery planning early on to provide a direction for recovery efforts in both actual and symbolic ways. The inability or perhaps resistance of the City of Galveston to engage in long-term recovery planning in the aftermath of Ike also reveals the value of having a pre-impact disaster recovery plan and planning process.

The local planners I interviewed described how overwhelmed they were during the months following Ike with issuing permits, damage assessments, updating GIS maps. The planning staff describe these tasks as short-term probably because there was a sudden massive increase in the volume of the work the staff had to complete in a short time. While short-term tasks are just as critical for long-term recovery, local planners argued they could have used high quality planning assistance to free some time and be able to better engage in long-term recovery planning by LTRC. Volunteer assistance was

not very helpful and was even a burden in some cases as they had very limited time to train incoming planning aid, no space and very limited equipment that volunteers needed to work. Therefore the local planning department was not able to take advantage of the help provided to them. Pre-disaster partnership among planning and development departments in neighboring communities with two elements can potentially enable local planners to help and get help with overwhelming volume of post-disaster work. The first element should be training programs that prepare planners to undertake disaster related tasks in an efficient and effective way within their partner community. The second, preparing the capacity to using the available assistance, for example by deciding what types of space or equipment needs the incoming planners might need and who is going to provide what to support them.

Had the City of Galveston had such mechanisms in place before Ike, they might have been able to respond to FEMA's call to start the process earlier and perhaps avoid the future conflicts between city councilmembers and mayor that led to a scramble in setting up the planning process. According to one the planning department staff:

> *"We told them (FEMA) we would be willing to do this plan starting in January and so that is when we started doing the recovery planning process because by that time things had at least calmed down enough that we could move forward with having more normal… three months to let us get a little bit more settled and in December they created that committee and made it such a large committee and then we started meeting in January."*

This perception among local planners about FEMA's rush to start planning is confirmed in Government Accountability Office's study of FEMA's Long-term Assistance in Texas following Ike: LTCR and local officials in Galveston reported that LTCR attempted to engage the local community in long-term recovery planning about a month after Hurricane Ike. However, because the city was still overwhelmed with emergency response activities, it had to delay acceptance of this assistance for about 6 weeks (GAO, 2010).

Galveston City Council started the ESF14 process by appointing the chair and members of the Long-term Recovery Committee on November 20th. That appointment process finished six weeks later and resulted in a committee that included 330 residents. The first core of the LTRC was comprehensive plan committee with 35 members that was responsible for bringing community input into revising process of Galveston's comprehensive plan at the time Hurricane Ike happened. However, neither the chair, nor the members of comprehensive plan committee were initially asked whether or not they are willing to serve on LTRC which denotes to ignoring the importance of communication by the council as the Local government body that intended to take the lead on post-Ike planning process. Part of this approach might have been a result of disagreements and unresolved conflicts inside the council that led them to act quickly in order to win the conflict. One of the LTRC members told me:

> *"I think we began to get mired in politics in the late October, early November of 2008 we had a tug of war between the mayor and the city council about who is going to appoint a long-term recovery committee to do any kind of planning on*

behalf of the city. The mayor had made an appointment of the chairman and she had council members were saying that you don't have the right to do that and so she resented this guy`s appointment…

What happened was I find out the Comprehensive Plan Committee is being appointed as the core of the long-term recovery committee,…the first thing we did was ascertain which Comprehensive Plan Committee member felt they would serve on long-term recovery committee and there were several that said we cannot do it. Our houses are in pieces, our businesses are in disaster, and we can't do that.

Literally unbeknownst to me _ at the time of the storm I chaired the comprehensive plan committee_ at a council meeting in November they appointed the comprehensive plan committee as the long-term recovery committee. I got a phone call, I remember I was grocery shopping and a friend called saying that you might want to turn on the television, I think they just appointed you chair of the recovery committee. I said I don't know. That is really bad, I mean that is a bad plan, you don't even ask the chair, you don't ask the person or the people , nobody talked to anybody on the comprehensive plan committee and they just appointed us."

The city council's approach to initiating ESF14 and forming LTRC was top-down on the one hand, and inclusive on the other. The Chairperson herself criticized the initiation from the very beginning but after accepting the position she had no control on

the rest of that appointment process which later affected the credibility and impact of the LTRC plan.

Community engagement in LTRC

ESF14 guidelines and procedure support involving the public in long-term recovery planning, however Galveston's style of public engagement was unique and new to the FEMA LTRC team that was assigned to support this process on the Island. As LTRC's chairperson put it:

> *"Usually the model or the template is that some FEMA consultants come in and they meet with 15 to 20 community leaders and then they go off and they write a long-term recovery plan... that is not Galveston Style... it was a process that I say they had never seen before."*

LTRC's style, that later became known as "Galveston Style" started to take form in October 2008, when Councilperson Beeton publicly accused Mayor Thomas in session of assembling a select committee of prominent citizens to secretly guide long-term redevelopment. This concern could have been related to two things, disagreement between the mayor and city council about mayor's selected LTRC chair (whom she dropped later) and also to the public housing conciliation agreement that GHA signed with housing advocates and HUD to rebuild public housing units demolished by Ike. Councilperson Beeton might have been concerned that recovery planning also leads to unfavorable decisions since a number of councilmembers including herself were against rebuilding the public housing projects as promised in that conciliation agreement. Therefore, city council, in an effort to ensure an inclusive open process, decided to take

the lead in the recovery planning by forming a very big committee during six weeks from November 20th until January 6th. Hence, internal conflicts among local government officials and seeking more local control over recovery decisions are perhaps two of the reasons for including 330 Galvestonians directly in recovery planning, as one of the LTRC leaders said:

> *"I went to the council and said 'I had 35 people* [and now] *I am down to 25. I need some more* [committee members] *and here is who I would like to have.' This council member come back to me and says 'well you are just hand picking people. People should have the right to sign up.' I said fine. 330* [members had signed up] *later when they stopped appointing. So we went from a committee of 25-30 people to a committee of 330 people."*

The procedure of the LTRC was described as "deliberately ground-up" to welcome a broad range of participation and input. It is suggested that the politicization of the disaster shock galvanized certain residents (Lord, 2011) into action. In the recovery environment, people share urgency for recovery speed; because of this, they demonstrate an urgency for participation (Chandrasekhar, Zhang, & Xiao, 2014). Interviewees who had served on LTRC offered positive evaluations of the inclusion and diversity among the members. For example one LTRC member said:

> *"a whole lot of people both young and old that had never been engaged civically before but they wanted to do something for their community and for many it was the first experience in a public service and that was neat! "*

However, from a critical perspective, the participatory dynamics showed a divide between a small but committed group engaged in the planning process, and a vast majority of Galvestonians who were not. The group who were engaged represented a "culture of participation" also prior to Ike since several of them were members of local groups and organizations. Lord (2011) observed that of the approximately 20 black Galvestonians who participated on the LTRC, many tended to serve doubly on the Northside Galveston Taskforce. He adds that Hispanic and Vietnamese Galvestonians were significantly under-represented and there were no advocacy organizations representing Hispanics' recovery interests, despite the fact that Hispanics comprise 31% of the population according to the 2010 Census (Lord, 2011).

While there was no formal boundary for inclusion or exclusion in LTRC, participatory exclusion occurred due to a number of reasons such as lack of personal interest, time availability, marginalized situation and skepticism about the procedure. Lord (2011) reported that at several open houses which were designed to collect public input, the number of committee members in attendance far exceeded "the general public". Talking about challenges of including marginalized citizens in participatory processes in a meaningful way, Director of a non-profit that serves poor Galvestonians on a daily basis alluded to this issue:

> *"...when you're finished (with work) you got to go and get the kids. And then ... often times people (who) are marginalized don't speak because they don't know what to say...They are not able to articulate it in a way that is received by someone who doesn't understand."*

Marginalized residents tend to be concerned most about day to day needs; and according to what Galveston advocates for the poor shared with me, they perceive little power to change anything. They generally do not know clearly what to say and know how to say it if they attend public engagement forums. Hence LTRC public forums might not have had much success in collecting input from these people by focusing on a public conversation about visions for the future of Galveston.

Previous studies found that using procedural forums like recovery committees can lead to more formal agreements and plans provided that they engage key decision makers and facilitate open dialogue on critical issues. Nevertheless, one LTRC member observed that

> *"…to some extent the people who run City Council didn't participate in this process. We had one or two city Council people. Mayor never came, maybe just came to make a speech. They were not engaged."*

Apparently those who were engaged in LTRC planning can be best described as Galvestonians who were willing to and had the ability to devote considerable amount of time and effort, motivated in part by optimism about the opportunity to affect recovery decisions and more broadly bringing change. This group also had a capability to seize that opportunity to make their voices heard. Consequently, skeptical residents and/or officials and marginalized and/or displaced residents did not take part in LTRC planning process.

In their accounts of community engagement in the committee, informants expressed both positive and negative opinions. Positive evaluations point to the hope,

perception of control, pride (Galveston Style), possibility, unity and the voice it gave to citizens through political participation, openness and transparency; commitment and hard work by members. For example, one of the planning department staff said:

> *"I would say it was successful for a couple of reasons. One because it allowed people to have a voice and allowed people to feel they are doing something to help their community and if for nothing else that was really valuable at that point for them. It was just giving them a voice and giving them a way to help their community was a huge benefit; just sort of to people psyche. It was good to be able to come together and feel like you are helping to rebuild the community."*

Negative evaluations of involvement of a large group in LTRC shows that different observers were skeptical about whether such inclusive process will yield meaningful outcomes from two different perspectives. The first group point to difficulty of deliberation (which is vital for successful planning) with a large committee and difficulty of sorting out unrealistic ideas and focusing on real priorities. The second source of skepticism came from marginalized groups. The comment below from an elite resident and advocate for the poor illustrates the skepticism among African American community towards involvement in LTRC:

> *"I have felt that all those hope that we had right after the storm, all of the hope that white people thought would change this island, the African American population were skeptical because … they never have done that and it ain't going to happen, and it didn't. "*

Procedures of LTRC

In January 2009 when LTRC started its work, the chairperson and the 330 members on board worked hard to make and keep the process inclusive, transparent and open to the public. This view was echoed by a number of informants, such as the director of one of the local government departments who participated in several of LTRC workshops:

> *"What I saw, of course I wasn't involved in every (workshop) but what I saw was that nobody`s idea was turned down. They tried to get every thought, be as inclusive as possible."*

In her report to city council while presenting the LTRC plan, the chairperson said:

> *"What we've figured out is that we live on one island and that we need to be one community,… It isn't about the East End vs. West End, or people who live behind the seawall vs. people who don't. We figured out that we're one Island and we need to work together."*

Despite the strong claims of unity, committee members were observed to be roughly divided into "pro" and "anti" real estate development, or industrial "development" versus "quality of life" factions. In general there was a large divide between development and quality of life advocates; the latter being disparaged as "pie in the sky" visionaries by the former as stated in the quote below from a member of a local pro-development group:

"we gonna go out start fixing streets and sidewalks in this community, [but there were some people who] *sit on the* [committee], *and say well, dream your new vision city. "Well, I think we need bike paths, we need trees here", meanwhile I'll leave the streets as are unpaved and there is no curb in a lot of places and there is grass growing up through the cracks in the sidewalks and there is litter everywhere."*

In contrast to real estate proponents, there were members who argued for feasibility of incubating a biotechnology research sector mainly because of UTMB's presence. These divergences of interests and visions for Galveston would reemerge during public deliberations of long-term redevelopment planning; inevitably discrediting the assertions of post-Ike "unity" in Galveston (Lord, 2011). The size of the committee and its short time frame (12 weeks) limited the possibility for meaningful deliberation and consensus building around various and sometimes conflicting visions. Chairperson of LTRC decided to manage the overwhelmingly big committee by two strategies: accepting and adopting every idea.

LTRC had to finish and present projects to the city council on April 9. To manage the LTRC process, the 330 group was divided into five subcommittees based on the interests collected in public meetings. Each subcommittee was assigned to provide visions, objectives and projects for a particular subject area and finally everything was accepted by the larger committee, even the conflicting ideas. Deciding early on that they *"can't control the process for that many people"* the committee decided to *"just accept what is coming in and think on it and adapt".* This approach explains part of the

contradictions and disagreements over some of the recovery projects proposed in the LTRC plan. Lack of consistency in the plan reduced its feasibility and support from city officials while the process brought cohesion and hope to the committee by bringing them together for a while.

Johnson (2014) suggests that the two considerations in deciding the stakeholder group's composition in recovery planning should be first, whose participation is essential in guaranteeing technical accuracy and thoroughness for the plan? And second, whose participation and support will enhance its political acceptability? (Godschalk, 2003). With respect to the first consideration, throughout the LTRC planning process, a number of the planning department staff attended and assisted in meetings, or provided limited data. However, I could argue that they were not leading the LTRC planning, rather they were supporting a public engagement process that could potentially generate input for planning. With regard to the second consideration suggested by Johnson (2014) as one LTRC member concluded *"Not having some of the key players on board hurt the credibility of the process and plan*."

A team from FEMA assisted Galveston LTRC in communications, running public forums, keeping records of meetings, writing the projects, providing background knowledge, and perhaps most importantly ranking the recovery projects. While the technical and logistical support from FEMA's Long-Term Recovery Team was significant and appreciated by the LTRC members, the local control on the procedures was maintained.

FEMA's LTCR team provided and applied a ranking tool for categorization of projects in terms of the relative value of the projects in relation to the recovery objectives. The categories assigned to recovery projects were intended to communicate which projects have a direct value to support recovery objectives, as opposed to broader community interests that do not support recovery challenges and needs. However, LTRC members seemed to (mis)understand the ranking of projects by FEMA' team as assigning implementation priorities to them; a perception the committee stated in the recovery plan. While the assigned recovery values were not intended to reflect priorities of Galveston and suggest an order for implementation of the plan, the committee members and citizens in general (unreasonably) expected that projects with high recovery value get funded and implemented.

Creating unreasonable expectations for implementation of projects might be in part due to the limited understanding of the utility of the tool among LTRC members. According to FEMA's LTCR officials the tool was intended to be used to communicate relative recovery value of the projects but not actually prioritize them. The FEMA officials said that they were unable to more effectively communicate the purpose of their recovery value tool as it related to the recovery plan or assist the City of Galveston with the plan's implementation (GAO, 2010).

The federal support for this local planning effort was limited to the short life of LTRC and did not continue. Government Accountability Office (2010) reports that LTCR program officials recognized that additional long-term recovery support would be needed by the city after they left, and accordingly developed a demobilization plan that

transferred oversight of remaining recovery duties to a regional FEMA staffer. However, the regional staff member met with city officials only once and had little additional interaction with them afterward (GAO, 2010).

As a result of the hasty assistance, FEMA's team made only an incomplete transfer of recovery planning guides and tools to the local planners. They were asked by FEMA leadership to end their assistance immediately after developing the recovery plan.

Challenges of LTRC

LTRC started to engage the community in long-term recovery planning through developing a vision, goals and recovery projects to guide Galveston on the recovery road. In reaching its purpose, LTRC faced a number of challenges and burdens. One of them is lack of planning expertise and skills for crafting realistic goals and implementation strategies for recovery. Planners can improve participation and make it "meaningful by providing citizens with information about problems and alternative ways of solving them and by providing opportunities for dialogue among citizens and between citizens and planners" (Burby, 2003).

A recurring issue in the LTRC planning, as in many other planning efforts, was finding funding sources for the proposed projects. The committee did not have and were not provided with adequate information about available funding opportunities for the projects they were proposing. Lack of "creativity in proposing funding resources", as one of my interviewees in a local government agency described it, limited the feasibility of the recovery plan.

Limited background information and expert knowledge about issues LTRC were supposed to plan for, insufficient time, and planning expertise for conducting analysis were also weakened the recovery planning by LTRC. Lack of fact-basis for decision-making was the reason there are several "study projects" proposed in LTRC plan. Those projects were proposed to create the fact-basis and inform future decisions of the local government.

Another challenge of LTRC was using local planning expertise. Planning department staffs tried to engage and support LTRC planning but not as much as they wanted to. According to the department head if the process had started 6 months later they would have been done with basic planning functions such as issuing permits and could discuss long-term recovery issues better. However, it can be argued that 6 months later might have been too late for post-impact recovery planning. I could suggest, based on the reflections of planners I interviewed, that perhaps if planning department was better prepared for undertaking short-term day to day recovery functions such as damage assessment, mapping, etc. with outside planning help, local planning resources would be more available and devoted to long-term planning and decision-making for recovery.

Engaging and obtaining support from the key stakeholders, specifically local government officials was difficult in the post-Ike planning effort. Despite rejecting politics in recovery planning, one of the LTRC members acknowledged the need for engaging local politicians, particularly the councilmembers in the planning process:

" ... on the one hand I wish it wasn't so political and on the other hand if it's got to be practical to get implemented they needed to participate."

In disaster recovery planning, self-conscious and inclusive deliberation can help community leaders make better decisions that reflect the broader understanding and respect for the lives and well-being of all the affected people (Birch & Wachter, 2006). True deliberation is more than discussion, it has a clear end point—a decision—and it is important to know that it is not always pretty or easy and, when done effectively has a good deal of controversy built into it and can be really tough (Birch and Wachter 2006). However, there are many advantages to having a true deliberative recovery planning process. As noted earlier, it seems that limited planning skills, short time frame, and disengaged local officials created circumstance in which the "accepting every idea" was perceived as the best strategy for managing the LTRC planning process. With this strategy, LTRC inevitably ignored controversies without deliberation.

Accomplishments of LTRC

LTRC showcases a community practicing bottom-up decision-making after a disaster. The relative openness of the participatory process of the Long-term Recovery Committee may ultimately be its most significant achievement, in spite of the impossibility of a Habermasian ideal of full access.

While planning rush limited deliberation and consensus building, several interviewees noted that early start of community engagement through LTRC helped with uplifting public spirit, optimism and empowerment. It created bonds and gave a sense of control to citizens that helped with psychological aspect of community recovery. People felt they are doing something important for their community and that would have helped them feel stronger and deal with their individual recovery challenges.

Those who were involved in LTRC take pride in it and believe that the *"committee did a great job"* of providing some priorities for recovery. The committee leaders argued that if there was a planning process already established, LTRC would have had more success:

> *" a process should have been in place already. I mean if you know you know you are prone to disasters, vulnerable to disasters, then figure out how you are going to function post disaster."*

The recovery plan by LTRC

The Long-term Community Recovery Plan was submitted and presented to the City Council in April 2009 and was only accepted rather than adopted, although not without disagreements. Within the Galveston Long-Term Community Recovery (LTCR) Plan, FEMA itself is not mentioned as an author, although the team from FEMA provided assistance to the committee in conducting the process and to some degree in writing parts of the plan. One of the planning department staff noted:

> *"We* [Galveston locals] *are strong on our own. This plan was crafted by our residents, with wonderful assistance from the government, but we wanted it to be ours. We were proud that we created it instead of an outside entity. We are the only LTCR Plan so far which was written in this manner."*

The projects in the LTRC plan

LTRC plan summarizes 42 recovery projects that the committee proposed to achieve sustainability and resilience as their vision for Galveston. In the testimony to City Council before presenting the plan, LTRC chairperson said:

"We learned that it wasn't going to be good enough to just take our community to where we were on September 12 of last year. We needed to plan to be stronger, more sustainable, and more resilient. We knew this plan needed to take Galveston to a better place. What we heard loud and clear from the hundreds of Galvestonians who talked to us was that our citizens want a community that behaves in an environmentally sensitive manner that protects its people, its infrastructure, and its natural resources."

Directed by this vision, the subcommittees each developed a number of projects (total of 42 projects) that could be classified in five groups:

- Green or sustainability projects such as "The Trees Project," and the West Galveston Island Conservation project"
- Community service projects to attract middle class population such as "multi-used high athletics complex", and a housing needs assessment along with projects that aimed the lower income population such as "transition from being renters to homeowners", "Neighborhood Learning Centers", as well as the UTMB-affiliated public health needs assessment project
- Controversial "development" projects like paid parking on the seawall and casino gambling feasibility study
- Infrastructure project such as sewer system enhancements, the enhancement and hardening of drinking water systems
- Historical preservation projects

Housing recovery among the projects

Housing recovery assistance, especially for low to moderate income Galvestonians, was often mentioned as one of the major struggles of the local government. While housing recovery was not adequately addressed by LTRC, even the proposed projects seem to have yielded limited outcomes for the Galveston. Local housing advocates involved in LTRC called for facilitating housing recovery for underinsured, low-to-moderate income homeowners in innovative, cost-effective ways. This call led, for example, to the initiative proposed by LTRC housing subcommittee to establish between one and three neighborhood "drop-in" for application assistance, design standards, and "green" building guidelines which unfortunately did not materialized (Lord, 2011).

A housing market assessment study was conceived in the LTRC housing subcommittee and incorporated into the LTRC plan. This proposed study could potentially provide some solutions to two problems that existed before Ike: increasing number of middle income families working in Galveston who left the Island for better housing and school options on the mainland, and the very high ratio of vacant housing on the Island. A third problem emerged after Ike with arguments against rebuilding public housing while there so many vacant units to meet the housing needs.

Housing market assessment project was contracted to CDM, the Massachusetts-based consultant hired to administer CDBG housing program as well. City staff, housing subcommittee members, and council members, had eager expectation for the anticipated market knowledge. However, the document that was eventually released by CDM in

June 2010 was just another hasty assemblage of facts and figures and recommendations that largely corroborated knowledge of city staff (Lord, 2011).

It could be argued that local planners might have been better situated to undertake a housing market study compared to CDM who had limited local knowledge and appropriate expertise[1]. Given the contested nature of housing issue in Galveston, local planners might also be more likely to possess relevant skills needed for building consensus among the housing stakeholders, such as apartment complex owners, homeowners associations, council members, housing advocates, UTMB as one of the biggest employer on the Island, etc. However, it should be noted that local planners may have not had the ability, staff, and particularly time needed to undertake a sound comprehensive study under the post-Ike circumstances.

Support for the plan

The fact that FEMA did not put their logo on LTRC plan denotes that the agency did not want to approve a recovery plan which was written only with their team's assistance and not their full control and authorship. As one local planner said:

"One interesting [issue] *that came out is ESF 14 FEMA folks refused to put their logo on the Galveston recovery plan and the reason … is because the Galveston people insisted that they have the final editorial rights because they wanted to ensure that what they wrote was what the committee said and because of that FEMA wouldn't allow their logo to be put on their plan."*

[1] CDM is better known for its expertise in infrastructure

The pride community and local government took in the LTRC plan had various degrees. While most committee members, planners and a number of local government officials were proud or approving of the LTRC plan and insisted that the city council accept it in its entirety, there were councilmembers, including one who had a role in forming and participated in LTRC process, who at the first round of voting refused to accept the plan for issues they had with two of the recovery projects. They objected to the acceptance of a document that they believed implicitly supported two projects whose premises they disagreed: Casio feasibility study and Ike Dike. Eventually the council accepted the LTRC plan. City Council held a number of workshops in May to review the plan for possible adoption but it was never officially adopted. Both LTRC chair and members who attended that city council meeting were disappointed by the objections:

> *"...we (committee) wanted them (city council) to accept this whole plan and there were people in the committee that disagreed with parts of the plan,... but when we got to city council some council members started picking it apart but the committee rose and said we don't agree with all the aspects of it but we want you to accept these as a whole."*

Ranking the projects: recovery value versus priority

As noted earlier, FEMA's Recovery Value Tool is used as a standardized methodology for assigning proposed projects a recovery value of high, moderate, or low. FEMA had a primary role in assigning recovery values to each project. However, according to the recovery plan, in addition to FEMA's application of its Recovery Value Tool's assessment, additional input was gathered from the numerous public venues and

the committee meetings and incorporated into the determination of a project's Recovery Value. These two different assessments were not always consistent.

According to the FEMA's guidance, a project that is categorized as having "moderate" value "provides benefits for some economic sectors," but "does not have communitywide or regional impacts, has limited community support and benefits, is difficult to achieve and sustain," and/or "has less definable outcomes." In this context, it could be unexpected that improving drinking water system and restoring the city's five wastewater treatment plants received moderate priority. The latter serve approximately 22,000 homes and can potentially attract population to the Island.

FEMA's team assigned a lower recovery value to infrastructure projects intended to restore the basic function and services of the city than to projects whose goal was to beautify Galveston. All of the city's infrastructure projects, such as rebuilding the city's water distribution system, sewer lines, and major bridges, were ranked as a lower or equal priority compared to projects intended to augment the city's beauty, such as enhancing the main beach area or redeveloping historic parts of downtown. For example, it is surprising that infrastructure recovery projects like providing sewer system to a part of town gets equal priority to "Take A Seat" project. The "Take A Seat" project proposed to rebuild and expand availability, visibility, reliability, and use of bus, trolley, and other mobility options for people to conveniently and quickly get everywhere on the Island without needing a car.

It is noted in the recovery plan that the size and complexity of some projects actually lowered their recovery value based on the FEMA tool. Infrastructure projects

are among the most expensive and complex projects in the plan. Therefore, it seems that the cost and complexity of projects might have been given more weight than communitywide or regional impacts and definable outcomes in determining the recovery value.

There seems to be some degree of disconnect between perceived utility of the recovery value tool by FEMA officials and the committee. FEMA's LTCR officials told GAO (2010) that their categorization of projects is intended to communicate to stakeholders only the relative value of the projects in relation to the recovery objectives, but not actually prioritize them. Nevertheless, the recovery plan stated that those values need to be considered when assigning priorities and time frames for implementation. The result was raising expectations. The committee and other Galvestonians expected to see "high priority" projects in the plan funded and implemented while some state and local officials preferred to use the limited funds for projects that they ranked as actually important.

Implementation

As noted earlier lack of information and consequently "creativity" for proposing funding resources, was one of the challenges of LTRC and limited the feasibility of the recovery plan. Moreover, since the plan was only accepted, no entity was required to and had allocated money specifically for implementation of the projects. As a result, some of the projects were implemented based upon personal or group interests and if there was a champion (with higher socio-political position) for them. Also projects that were already proposed before Ike had a higher chance of implementation.

The recovery plan had a number of indirect impacts. Some of "green" building guidelines from LTRC plan have been incorporated into the latest Comprehensive Plan that was finished in 2011 and that the recovery projects informed allocation of the first round of CDBG funds to some extent. However, perhaps because it was not adopted by the city, officials emphasized the positive indirect impact of the LTRC planning process in bringing the community together rather than any direct impact the plan may have had for actually guiding the recovery process in terms of implementable projects. For instance a local official noted:

> *"…it felt good at the time… I feel like there's been a bit of disconnect, and, but you know I think it informed … our identification of what we want to spend our CDBG money on."*

Conclusion

The Galveston LTR process showcases community engagement and cooperation after Ike. The focus on cooperation and engagement reinforced positive planning goals like empowerment, sense of ownership, optimism, unity, and yet there were negative consequences like ignoring conflicts, accepting every idea without consensus building, rush and little deliberation, and limited support from authorities. The biggest accomplishments of LTRC process in G*a*lveston are perhaps the strong community involvement and transparency which were found to be vital for the support and credibility of this process in the community.

Galveston sets a good example for other communities in undertaking a bottom-up grassroots decision-making process despite the challenges and limitations it faced. On

the one hand, it shows the value of providing the opportunity for citizens to have a voice in the recovery decisions. The wide community engagement could be interpreted as an opportunity for better planning following a disaster since it may not be easy to attract wide public participation in normal time planning, as several of research informants suggested too.

Community engagement experience in Galveston, on the other hand, could potentially strengthen recovery planning by generating ideas and support from citizens. However, perhaps because of the failure to actually develop consensus and political will on the part of the committee, the plan was never officially adopted by the city and as a consequence many of the 42 projects presented by the Long-term Recovery Committee remained unimplemented. Therefore, the hope embedded in recovery initiatives decided by the community, had increasingly given way to distrust especially of the local government.

Study of recovery planning in Galveston revealed the importance and challenges of planning for recovery at the local level. several of the informants suggested that the recovery plan could have been more effective if it had financial feasibility, political support and community buy-in. To seize the window of opportunity (massive community engagement and availability of federal recovery funds) Galveston needed a strong planning process. While replacing what was damaged by Ike, Galveston used the opportunity to finish the comprehensive plan with a disaster mitigation element, demolish the old and vulnerable public housing units to rebuild quality housing for low income residents, to replant the trees, clean the beach, etc.

One of the most important lessons that the post-Ike experience of Galveston echoes is to bring a proactive approach to recovery planning. My findings demonstrate the need to encourage localities to inclusively plan in advance for seizing the post-disaster opportunities for the interest of community rather than passively react to the conflicts or simply ignoring them. Galveston has demonstrated the importance of not only engaging the citizens, but also key stakeholders who, through their expertise and influence, can potentially help generate ideas based on actual deliberation on difficult issues. Furthermore, inclusive does not mean accepting every possibility, it also means developing consensus on central ideas and providing some focused goals. It is more feasible to establish such inclusive and deliberative planning processes with a wide range of participants before a catastrophic event than afterwards.

Local planners and organizations noted a range of possible improvements particularly towards advancing disaster resilience that could have been achieved during the window of opportunity after Ike. Recovery funds could have been effective in seizing that opportunity while addressing some of the old issues as well. However, unlike what some of the LTRC members imagined, federal assistance and the recovery projects (if they were implemented) probably could not change the underlying forces that have shaped Galveston on a barrier island.

One of the shortcomings of recovery planning after Ike was failing to develop a fact-based and consensus-based vision for future that is supported by key stakeholders. Lack of such vision limited LTRC`s effort to a successful engagement process that generated ideas rather than a deliberative inclusive planning process. However, such

vision and process might have been out of reach with the circumstances in which LTRC was working.

CHAPTER IV

3RD ARTICLE: PLANNING FOR LONG-TERM COMMUNITY RECOVERY: LESSONS FROM MEASURING RECOVERY AFTER HURRICANE IKE

Introduction

With the increasing emphasis on the need for preparing for long-term recovery (Leonard & Howitt, 2010; Smith, 2011; Smith & Birkland, 2012), it is crucial to conduct more systematic analyses of recovery outcomes and processes. Quantifying community recovery to establish empirical patterns, and describing the overall picture of recovery can inform recovery and mitigation planning. Comparing sectors within a disaster helps to understand, track and compare recovery, identify assistance needs, and inform post-disaster decision making.

Commonly-available statistical data provide useful tools for quantifying recovery; however, these tools remain underutilized (Chang, 2010). Capturing overall community recovery requires well-defined recovery measures and indices as well as historical or regional databases. Population change, median household income, economic structure, housing value, and number of businesses are among the most frequently used indicators to measure the community recovery.

Researchers have either compared the disaster-stricken city with a reference region, which was not affected with respect to recovery indicators, or used time series to build long-time trends of recovery indicators for the affected area. Attempts at developing multiple indicators to measure different dimensions of recovery mostly focus

on catastrophic disasters in large metropolitan areas, for which time series data are more regularly published. Hence, there is a gap with respect to measuring recovery in smaller communities that are extensively affected by disasters.

Very few studies have systematically examined long-term recovery of different sectors and subpopulations within communities using time series statistical data (Chang, 2010; Zhang & Peacock, 2010). Quantitative studies of recovery have rarely addressed various aspects and recovery of different sectors together; the focus in the literature is either on modeling disaggregated housing recovery, or examining long-term aggregate level population, business, and economic recovery in larger communities affected by catastrophic events. Hence, it is necessary to develop a measurable definition of recovery that integrates significant sectors of this phenomenon, in such a way that community recovery can be comprehensively understood, and apply this definition to smaller communities that are extensively affected by natural disasters.

Research Question and Hypothesis

This article presents a quantitative assessment of recovery in Galveston, Texas following Hurricane Ike (2008) with two purposes. First, I developed a measurable definition of recovery that integrates significant dimensions of community recovery. Second, I quantified community recovery to describe empirical patterns of population, economic, and housing recovery. The central questions of this study are the extent of which Galveston has recovered from the impact of Hurricane Ike at the aggregated and disaggregated levels, and what is the relationship between social vulnerability and rate of recovery. More specifically, I will address these questions:

- To what extent has Galveston has recovered from the impact of Hurricane Ike with respect to its population, economy, and housing?
- Did different forms and types of housing and across all neighborhoods recover at similar rates and levels?
- If there were differential in recovery trajectories, what aspects of social vulnerability were associated with slower housing recovery?

As can be seen in Figure 1, Hurricane Ike made landfall on the east end of Galveston Island, after decreasing in intensity from a Category 4 to a Category 2 storm following its path over Cuba, in the early morning of 13 September 2008. Twelve fatalities in Galveston and Chambers Counties are directly attributable to Ike (Berg, 2009). Total financial damage from Ike in Texas, Louisiana, and Arkansas is estimated at $24.9 billion dollars, making it the 4th costliest hurricane in U.S. history, after Katrina, Sandy and Andrew (Berg, 2009). While Ike was only classified as a category 2 hurricane in terms of wind speeds, when it hit the Galveston area, its surge was much larger than what would be normally attributed to such a storm. Much of that surge overtopped Bolivar peninsula, scouring away homes, foundations, and infrastructure. Furthermore, the surge traveled up the Houston ship channel, and flooded Galveston Island from the bay side, flooding much of the city's urban core. The maximum high water mark recorded by FEMA was 17.5', located on Bolivar Peninsula (Highfield et al., 2010; Van Zandt et al., 2012). This surge event caused severe damage to structures on Bolivar Peninsula.

Figure 1. Location of Galveston Island

In undertaking this analysis there are a number of factors, related to the unique aspects of the Galveston area, which should be considered. The spatial development patterns and pressures, as well as hazard risks that occur in areas such as Galveston Island and Bolivar Peninsula, may be considerably different from those found in typical urban and rural areas. Development pattern in Galveston Island is bifurcated with a denser and much older urban core on the island's east side, which was protected by a sea-wall erected after the infamous 1900 storm, and newer development, primarily devoted to vacation and retirement homes, utilizing better building codes, on the West End. On Galveston Island, 7.5% of housing is counted as vacation or recreational by the

2000 census, and a disproportionate share of its housing is renter-occupied (56.4%) compared to owner-occupied. In addition, Galveston has experienced steady population decline since the 1960s, which, as we shall see, was accelerated, at least temporarily by Hurricane Ike. As a result, many households left the Island, either because they were forced to find housing off the island, or, in the case of many middle class families with children, were able to find more affordable housing options while still commuting to Galveston for work. It is also noteworthy that the global economic and real estate crisis occurred in 2008, the same year as Hurricane Ike. In this context, refinancing and financing housing recovery might have been particularly difficult.

Measurement, Data and Analysis Methods

The first step in measuring recovery is defining it with respect to a reference. Disaster can be viewed as setting an urban system into at least a temporary instability, wherein the system experiences rates of change that exceed the pre-disaster normal range. From this viewpoint recovery occurs when rates of change return to normal (pre-disaster) range. This perspective will allow for structural changes in the system where an indicator is stabilized at a new level but the rate of change is back to the normal range. Chang (2010) suggested that measuring recovery with this new normal approach should focus on flow variables measured at given periods of time, with an inherent dimension of temporal change. However, she also recognized the applicability of stock variables, measured at a given point in time, when comparing recovery of sub-populations within a disaster.

Deciding which indicators to use for measuring recovery depends on availability of the data as well as particularities of the community/disaster under study. The most important criterion is that the indicator should be meaningful from the point of view of policy and decision making in the affected community (Chang, 2010). It is also crucial to distinguish the effects of the disaster from other exogenous trends that affect regional growth and change, such as the global and national economic crisis that occurred within days of Hurricane Ike. This can be achieved by normalizing local levels to the regional levels, and also through comparing local rates of change to the pre-disaster local rates of change. Inquiry into recovery differentials across sectors, neighborhoods, and population groups is required, because effects of disaster may not be apparent from aggregate statistics.

Chang (2010) proposed a set of criteria and indicators for measuring and comparing disaster recovery across different disasters, and within segments of a community affected by one disaster. That set of indicators was then used to quantify recovery of Kobe, Japan after the 1995 catastrophic earthquake in terms of population, businesses, economic production, income, and port traffic. For this study, I applied the principles suggested by Chang (2010) to select appropriate indicators from the ones used in previous studies based on particular characteristics of Galveston and Hurricane Ike as well as availability of data. I measure recovery of Galveston in three dimensions of population, economy, and housing. Depending on the specific recovery indicator and objectives in each part of this assessment, a combination of descriptive and bivariate (or

partial) correlation analysis was used to track changes or build trends, compare changes, examine relationships, etc.

Table IV summarizes the indicators and data sources I used to track the post-Ike recovery in Galveston at aggregate and individual levels. The population levels of the city were tracked for a 13-year period, which covers eight years prior to Ike and five years after Ike. It is assumed that the five years after Ike is long enough for the city to reestablish the pre-Ike rate of change, so that the contextual trend of population decline since 1960s is distinguishable from the recovery of population lost by Ike, which is the subject of interest in studying the trend.

The population recovery may not have similar patterns in different segments of the city and among different race and ethnic groups as well as across different spatially located neighborhoods. To assess changes across neighborhoods .Block group was used as an equivalent to a neighborhood. However, due to lack of annual population data at block group level, and the number of block groups (68), which makes comparison of trends rather difficult, I compared population of block groups at two points: before and after Ike. ACS 2005-09 population data are used as the pre-Ike population data, and ACS 2009-13 data are used as the post-Ike population data. The problem with these data are of course that 2009 data (when population is expected to be at the lowest level) are included in both 5-year estimates, which are meant to represent two comparable periods. Therefore, it is difficult to separate the effects of the disaster from pre-disaster (2005-08) changes and long-term trends independent of the hurricane. Therefore these data are supplemented by using Census 2000 and 2010 data as well as ACS 3 year estimates,

which have better precision in capturing changes due to Ike. ACS 2005-07 represents pre-Ike racial/ethnic composition of the city and ACS 2011-13 along with ACS2008-10 represent post-Ike racial/ethnic composition respectively immediately after Ike, and 3-5 years following Ike.

Economic recovery is assessed in terms of the diversity and share of industries in terms of employment and earnings. Inflow-outflow analysis is also helpful in exploring the impact of Ike on the one of the major challenges of Galveston: population loss in spite of employment growth. Changes in the share of each industry in employment and the types of jobs by earnings demonstrates the disparities in economic recovery across economic sectors. The shares of 2008 were compared to the shares of 2011 for the city, and then, the changes were compared with the changes in the same period for Galveston County and State of Texas. By comparing the local changes to the regional economy, effect of contextual trends are taken into account. If the pattern of changes is different in size and direction from those of the county or state, it can be attributed to the hurricane.

Table IV. Indicators of recovery

Dimension	Indicator	Level	Type	Data source	Data Interval
Population	Population change	City	Time series	Intercensal population estimates 2001-13	Annual
	Population change	Block Group	Before/after Distribution: map	ACS 2005-9 w/ ACS 2009-13	5 years
	Population composition change by race/ethnicity	City	Before/after	ACS 2005-07 w/ACS2008-10 w/ACS 2011-13 Census 2000 w/census 2010	3 years
	Population composition change by race/ethnicity	BG		ACS 2005-09 w/ACS 2009-13	5 years
Economy	# jobs by industry (main industries)	City	Time series	On The Map (LEHD)	Annual 2002-11
	share of industries from total number of jobs (main industries)	City	Time series	On The Map (LEHD)	Annual 2002-11
	Jobs by earning	City	Time series	On The Map (LEHD)	
	Inflow of workers	City	Change in % Time series	On The Map (LEHD)	Annual
Housing	Average appraised value	City by housing type	Time series	Galveston County Appraisal District (GIS parcel shapefiles and attribute tables)	Annual 2008-12 parcels aggregated to city
	Average appraised value loss 2008-09: Damage	Parcel by housing type		Galveston County Appraisal District	Annual 2008-12 parcels aggregated to block groups
	damaged housing reaching restoration levels	Parcel by housing type	Distribution by type	Galveston County Appraisal District	Annual 2008-12 parcels aggregated to city
	Average #years to restore pre-Ike appraised value	Parcel by housing type	Distribution: map	Galveston County Appraisal District	Annual 2008-12 parcels aggregated to block groups
	# years to restore pre-Ike appraised value and appraised value change 2008-10, 2008-11, and 2008-12	Parcel by housing type	Partial correlation with neighborhood social vulnerability indicators	Galveston County Appraisal District and ACS 2009 5-year estimate	

The data for housing recovery analysis are drawn primarily from the Galveston County tax assessment parcel data for Galveston island and the Bolivar Peninsula. Specifically, I selected residential parcels with single-family, multifamily, and duplex designations for the five years from 2008 through 2012 based upon the 2008 land use designation.[2] Simply because a parcel is designated as residential with one of these classifications, does not necessarily mean there is actually a structure on the property. Hence I focused on only each parcel's "improvement" assessment value, which captures the tax assessed value of the structure on the property, not the land value itself. Parcels were included in this analysis if they were single family or duplexes with improved values of $7,500 or above, multi-family structures valued at $30,000 or above, and either remained with their 2008 land-use classification, or became vacant through each of the 5 years[3]. The final sample size consisted of data on 24,667 parcels of which 23,587 are single-family, 140 are duplexes, and 940 are multi-family structures.

A parcel's assessed improvement value is the basis upon which hurricane damage and recovery is measured. Damage is assessed in relative terms by calculating the loss in assessed value between 2009 and 2008 assessed.[4] Different authors have measured housing recovery in a variety of ways. Wu and Lindell (2004) and Henry

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[2] Appraised value assessments are drawn from Galveston County Appraisal District tax data 2008-2012. The improvement values are assessed by property appraisers during the first half year, and the initial property appraisals are sent to all property owners in late August and early September. Property owners can challenge the appraisals during the following months, and the adjustments can be made through December. Therefore, the appraisal values of 2008 reflect the appraised values during January 2008 to June 2008, about 3 to 8 months before Hurricane Ike. According to Texas Constitution, all property is taxed each year as of its status on January 1.

[3] There were also approximately 20 single-family structures that were reclassified as multi-family because their internal structure was subdivided into apartments that remained in the analysis.

[4] Damage = [(2008 assessment – 2009 assessment)/2008 assessment] * 100

(2009) measured the speed of housing reconstruction by the time at which rebuilding permits were issued (Wu & Lindell, 2004). Zhang and Peacock (2010) and Peacock, Van Zandt, Zhang and Highfield (2014) used appraised improvement value changes (Peacock et al., 2014; Zhang & Peacock, 2010) and Cutter et al. (2014) relied on the in situ observation of a structure to determine the level of recovery in a longitudinal study (Cutter et al., 2014). I used the parcel's appraised improvement values to track recovery and restoration. Restoration is defined as returning to pre-Ike appraised value, and I tracked how long, on average, it took various forms of housing to reach restoration levels. Recovery is measured as relative gains toward meeting and exceeding pre-impact assessed values.

Extent of damage, as well as recovery of different housing types, might vary due to effects of social vulnerability, which are not accounted for by the average patterns. To understand the relationship between social vulnerability and rate of housing recovery in Galveston I used partial correlation analysis between damage as well as recovery with social vulnerability indicators that I obtained from ACS 5-year estimates at block group level.

Analysis and Findings

Population recovery

Total population

As noted above, Galveston has experienced population decline since 1960s. The population trend for the 2000-2013 period is presented in Figure 2 which covers eight years prior to Hurricane Ike and five years after Ike. During the eight years before Ike

the average annual rate of change was -1.64% with the maximum decline between 2000 and 2001 equal to -1.88% and minimum decline of -1.19% between 2001 and 2002. In the year following Ike (with more than nine months in the July 2008-July 2009

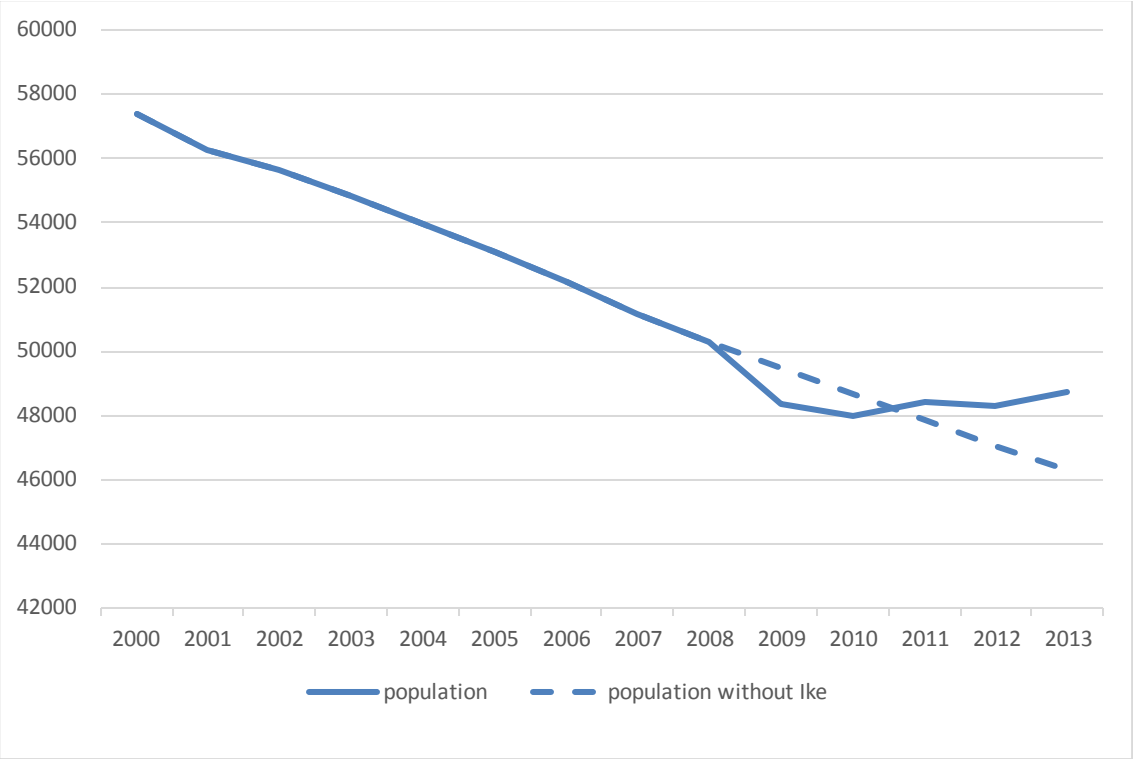


Figure 2. Population trends: with and without Ike

estimations period) Galveston recorded the biggest population loss across the thirteen-year period presented here with 3.79% decline. That is 2.32 times the average population loss the city had suffered during the eight years prior to Hurricane Ike.

The population trend after Ike however, is different from that of before Ike as we can see in Table V. The average loss in the eight years prior to Ike is -1.64% while in the five years post-Ike it reduced to -.61%. If Ike had not happened, and population

Table V. Total population estimates, Galveston, TX

year	population	annual change	Note
2000	57376	0	estimate July1st
2001	56297	-1.88	post-estimate
2002	55628	-1.19	post-estimate
2003	54861	-1.38	post-estimate
2004	53950	-1.66	post-estimate
2005	53122	-1.53	post-estimate
2006	52141	-1.85	post-estimate
2007	51181	-1.84	post-estimate
2008	50281	-1.76	post-estimate
2009	48374	-3.79	post-estimate
2010	47963	-0.85	estimate July1st
2011	48444	1.00	annual estimate
2012	48310	-0.28	Quick facts, annual estimate
2013	48733	0.88	quick facts, annual estimate

continued to decline with the same average rate of 2000-2008, in 2013 the population should have been 46,300 which is significantly (2,433) lower than the estimation for 2013.

Hurricane Ike was an anomaly in the long-term trend of population decline. Before reaching a new normal state, which is defined as a state where post-impact rates of change are similar to pre-impact rates of change, Galveston's population rate of change is fluctuating: it can be seen in Table V that from 2010 to 2011 annual growth rate is 1% and from 2012 to 2013 it is .9% which may indicate return of some of the residents that had temporarily left after Hurricane Ike. By 2013, population of Galveston has not stabilized at a new normal state compared to the pre-Ike period; perhaps because on the one hand, five years is not long enough for stabilizing a population trend after a

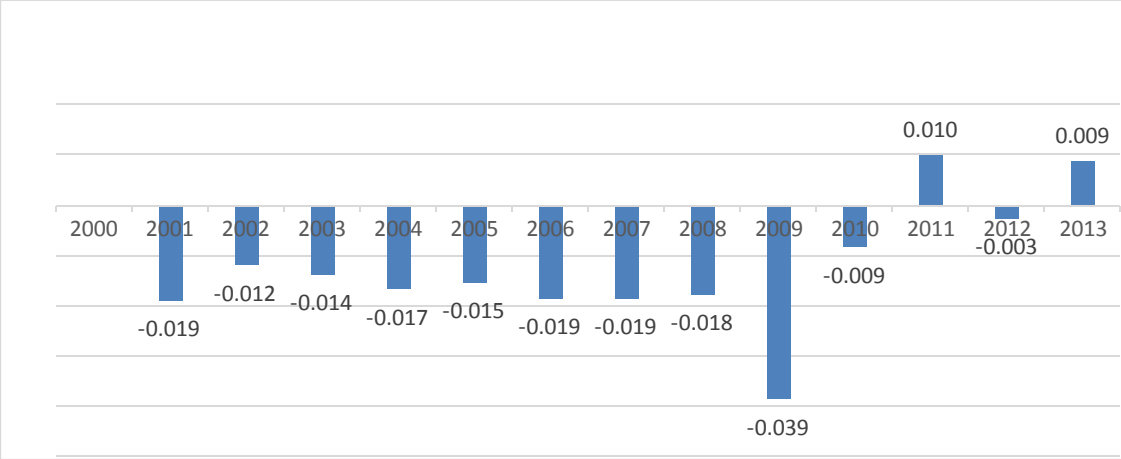


Figure 3. Galveston population: annual exponential change rate

shock, and on the other hand, the post-Ike trend has a different rate of change from the pre-Ike period. Galveston might see steady population gain instead of steady decline as evident in the present fluctuation.

Table VI shows that the total population has declined by 16.6% between 2000 and 2010 censuses. In absolute terms, all of the racial-ethnic groups have lost population

Table VI. Population composition change from Census 2000 to Census 2010

race/ethnicity	census 2000	%	census 2010	%	absolute change	share change (percentage points)	% change
Total population	57247		47743		-9504		-16.6%
Hispanic/Latino (of any race)	14753	25.8%	14925	31.3%	172	5.5	1.2%
Not Hispanic White	25277	44.2%	21500	45%	-3777	0.8	-14.9%
Not Hispanic Black	14422	25.2%	8895	18.6%	-5527	-6.6	-38.3%
Not Hispanic other	2795	4.9%	2423	5%	-372	0.1	-13.3%

except for the Latinos, who experienced an increase of 172 individuals or 1.2% between the two censuses. African-American minority experienced the largest population loss in both absolute and relative terms, respectively, by 5,527 individuals and 38.3%. Not-Hispanic White population has the second rank in population loss, and decreased by 3,777 individuals or 14.9%.

The racial composition of Galveston has changed from 2000 to 2010, potentially as a result of the population displacement following Hurricane Ike. This is shown in Table VI. While not-Hispanic Whites' share of population has remained almost unchanged, the share of Hispanic population has increased by 5.5 percentage points while share of African-American minority has declined by 6.6% points. That means the group that was most affected by Hurricane Ike was African-Americans, partly as a result of slow housing recovery program and long delays in rebuilding public housing.

If we now turn to American Community Survey estimates of the population by race and ethnicity, we can compare the pre-Ike and post-Ike population composition

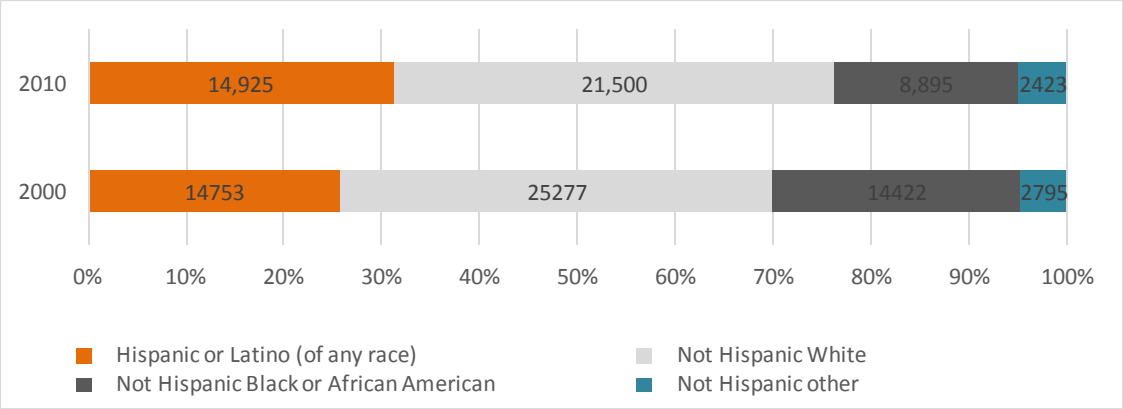


Figure 4. Population census 2000-census 2010

better and in a more meaningful time frame. The pre-Ike racial-ethnic composition from 2007 ACS 3-year estimates were compared to the post-Ike racial-ethnic composition three-year estimates from 2010 ACS 3-year estimates and the 2013 ACS 3-year estimates. Table VII presents the absolute and relative change in the population of each category along with its aggregate margin of error (margin of error for the difference). The first four columns of the table show the absolute population change estimates with margins of error. The difference Values with large margins of error mark where the estimated difference might be zero at 90% confidence level (no change from pre-Ike to post-Ike).

During the first three years following Hurricane Ike, total population is estimated to have decreased by 4961 ±2568 individuals from the 3-year period of 2005-07 to the 3-year period of 2008-10. During the second three-year period following Hurricane Ike (2011-13), total population decreased by 5589 ±2569 individuals compared to the 2005-07 estimate. The continued population loss in the second 3-year period following Hurricane Ike could be attributed to the historical and long-term population decline in Galveston that was occurring even before Hurricane Ike. Comparing these ACS 3-year estimates indicate continued population loss, contrary to the fluctuations in total population level after Hurricane Ike (see previous section) which indicate population growth.

The absolute changes show that between the three-year before Ike and the three years after Ike, non-Hispanic White population decreased by 2967±2146 individuals and non-Hispanic Black population decreased by 2367 ± 1723 individuals. The 90% margins of error for Hispanic and non-Hispanic other populations are larger than the estimated difference. Therefore, there might be no statistically significant change for those two categories. To further explore the changes in the racial and ethnic composition, relative changes by population group are presented in the last two columns of Table VII.

The analysis of change in population composition may be somewhat limited because ACS estimates are provided for raw numbers and not the percentages of each racial/ethnic group with margins of error. Consequently, I cannot estimate the change in the share of each racial-ethnic category. Instead, I calculated the relative changes based on raw number estimates only (without margins of error). While absolute changes of the Not-Hispanic White and Black population following Hurricane Ike are similar, the relative change in Black population is almost twice that of White population: 22% loss of Black population versus 11.8% loss of White population during the three years

Table VII. Population composition change (estimates) from ACS 3-year 2007, to ACS 3-year 2010 and to ACS 3-year 2013

	change *ACS2007-ACS2010*	MOE	change *ACS2007-ACS2013*	MOE	*%change ACS2007-ACS2010*	*%change ACS2007-ACS2013*
Total:	-4961	±2568	-5589	±2569	-9.2%	-10.4%
Hispanic	631	±2433	-1275	±2197	4.2%	-8.5%
Not-Hispanic White	-2967	±2146	-2895	±1918	-11.8%	-11.5%
Not-Hispanic Black	-2367	±1723	-1038	±1649	-22.0%	-9.7%
Not-Hispanic other	-258	±917	-381	±863	-8.7%	-12.8%

following Ike.

Both analysis of censuses 2000 and 2010, and comparison of ACS 2007 three-year estimates and ACS 2010 three-year estimates indicate that during the first three years following Ike, non-Hispanic White population experienced the largest absolute population loss but non-Hispanic Blacks suffered the largest relative population loss. However, comparing 2005-07 to the 2011-13 estimates, only for the non-Hispanic White population can I suggest that these changes were statistically significant. It is apparent from Table VII that in a longer time frame, non-Hispanic White population continued leaving the Island, as it is also apparent in Figure 5.

Spatial distribution of population by block groups

Since development patterns and population composition vary significantly across Galveston Island, the population change following Hurricane Ike is also expected to vary among neighborhoods. To explore the distribution of post-Ike population at neighborhood scale, I calculated the absolute and relative population change from pre-

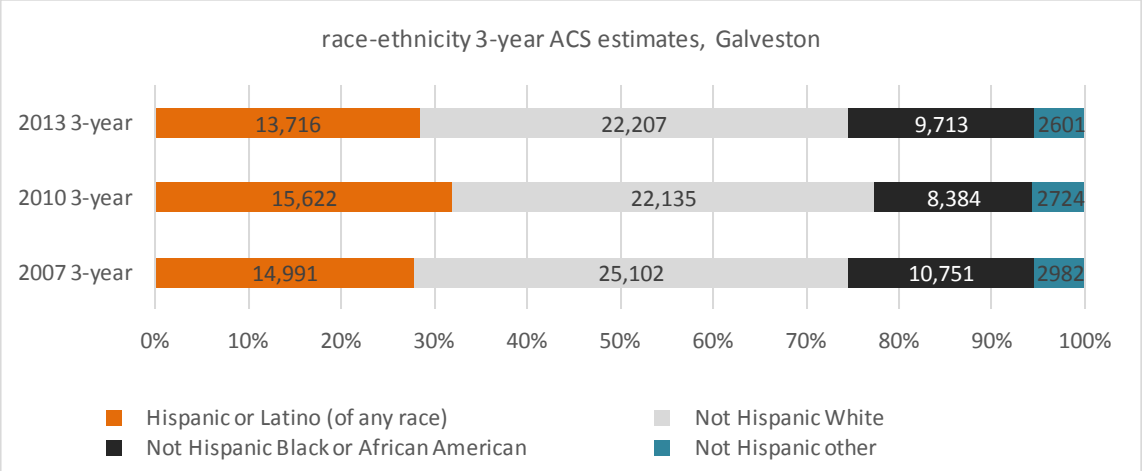


Figure 5. Race-ethnicity 3-year ACS estimates, Galveston

Ike to post-Ike for each block group using estimates of 2009 5-year ACS and 2013 5-year ACS. With the decennial shifts in the boundaries of block groups, some of the block groups in Galveston Island and Bolivar Peninsula have merged, split, or both merged and split into new block groups in 2010 so that the number of Block groups have reduced from 71 to 65 in 2010. Therefore, first step for calculating population change at block group level was to check and find all of those boundary and ID changes and prepare a common and comparable set of block groups.

I made a table with the list of 2009 block groups that are consistent with the 2013 block groups, both in terms of boundaries and ID, with 5-year population estimates and change Values. The average population size of block groups decreased from 1131 in the 2005-09 period, to 970 in the 2009-13 period. The variability of population size also decreased from 534 to 482 in the second estimation, indicating that after Hurricane Ike, on average, block group population decreased and the number of smaller block groups rose.

Out of 71 block groups, 51 in Galveston and Bolivar lost population between2005-09 and 2009-13 estimation periods. The minimum absolute population loss was 5 individuals and the maximum population loss was 787 individuals for one block group, while the smallest relative population loss was .7% and the largest relative population loss was 54.7%. Eighteen block groups gained population during the 5 years following Hurricane Ike, ranging from 5 to 396 individuals, with the highest relative gain of 74%.

In order to assess the spatial distribution of population loss and gain across Galveston Island and Bolivar Peninsula, the block groups' population table was joined to the 2009 block groups' GIS shapefile of Galveston Island and Bolivar Peninsula in GIS. Maps in Figure 6 and Figure 7 illustrate the spatial distribution of absolute and relative population change by block groups in five categories. Maps are zoomed to the east end and Urban Core of Galveston where population density is higher and block groups are smaller.

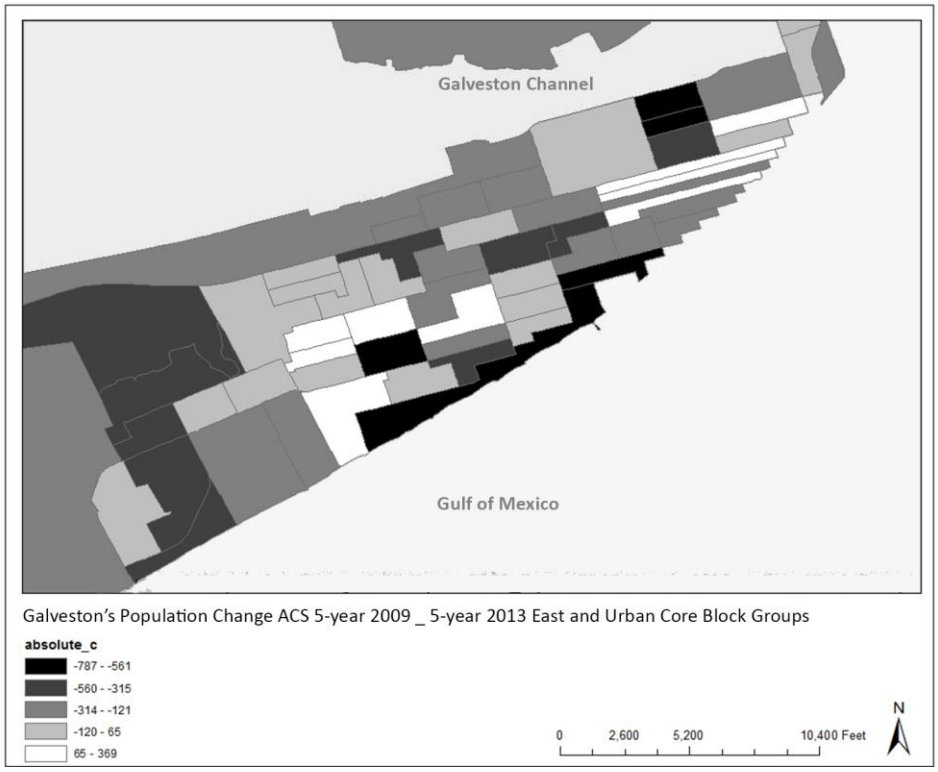


Figure 6. Absolute population change by Block Group: from ACS 2005-09 to ACS 2009-13

Both of the block groups that suffered the highest absolute and relative population losses and those with population growth are located in the east side of Galveston.

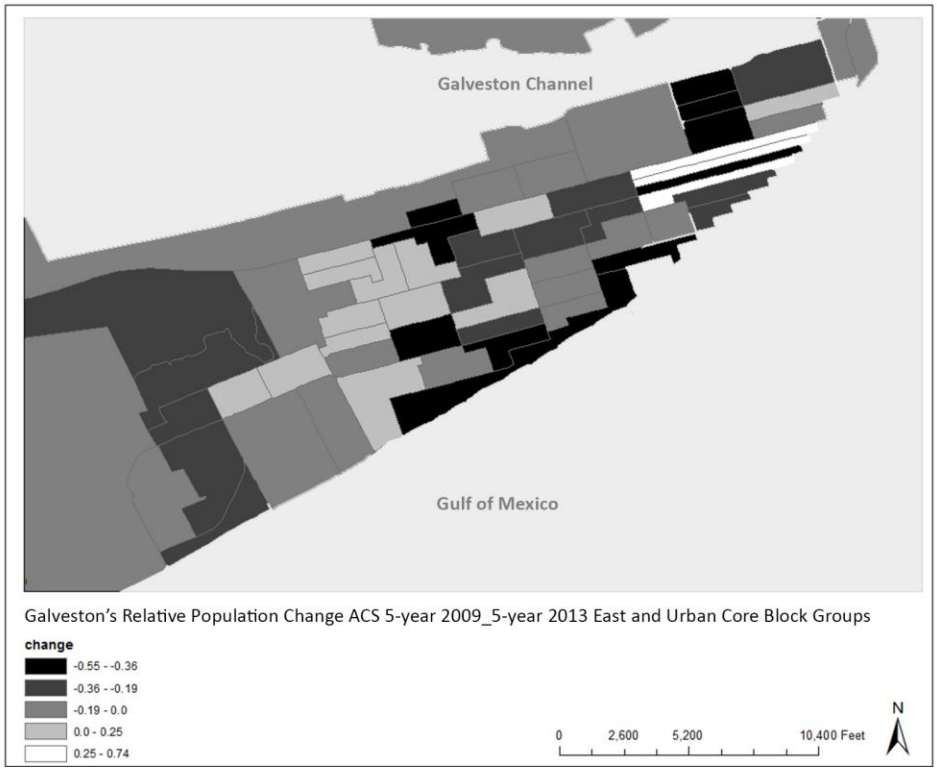


Figure 7. Relative population change by Block Group: from ACS 2005-09 to ACS 2009-13

Neighborhoods adjacent to Seawall (on the south side of Urban Core) and the ones closer to Galveston Channel suffered relative population losses as high as 55%. It is particularly important to note that one of these block groups was the site of Magnolia Homes, a public housing project that was demolished after Hurricane Ike. Furthermore, as a result of population loss in several of the Urban Core block groups, many of them were merged in 2010 census maps.

Economic recovery

To understand the economic impact of Hurricane Ike on Galveston and assess economic recovery, this analysis addresses three indicators of local economy:

distribution of jobs by industry, distribution of jobs by earning, and inflow of workers into Galveston.

Distribution of jobs by industry

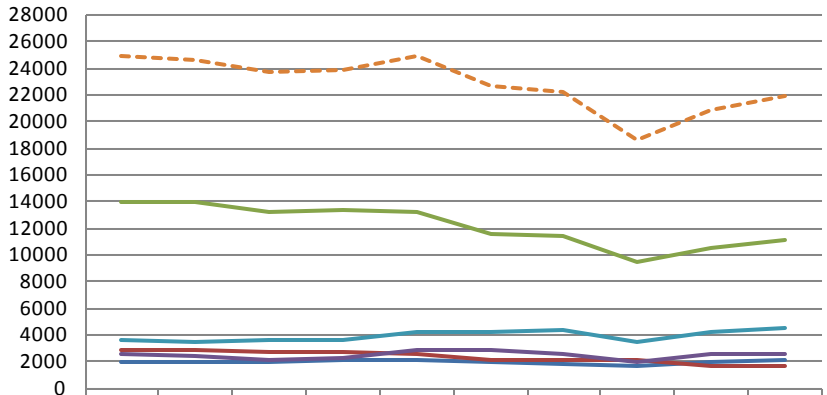
The purpose of this analysis is to examine whether and how the economic structure of Galveston has changed as a result of Hurricane Ike through changes in contribution of major industries to the job market on the Island. Number of jobs for major industries, including the ones with more than 5% share of total jobs, were compared from 2002 to 2011 using Origin-Destination Employment Statistics (LODES) data (http://lehd.ces.census.gov/data/#lodes). The industries with more than 5% share of all jobs for Galveston include: Educational Services, Accommodation and Food Services, Retain Trade, Finance and Insurance, Healthcare and Social Assistance) Absolute and relative change was also compared between 2008 and 2009 (indicating loss of jobs) and then between 2009 and 2011 (indicating recovery of jobs).

As it is displayed in Figure 8, with the exception of more than 1000 jobs increase from 2005 to 2004, on the whole the total number of jobs in major industries was slowly declining before Hurricane Ike As might be expected given the hurricane and the economic meltdown, total number of jobs in major industries fell sharply from 22,293 jobs in 2008 to 18,663 jobs in 2009 which marks more than 16% loss. Since the national economic meltdown occurred during the same year, it may be difficult to distinguish between the impact of Ike and the national trend on the level of jobs in Galveston. Interestingly in the two years after Ike for which data are available, Galveston has not

resumed its pre-Ike trends nor do we see a "new" normal emerging, unless that new normal is growth, although not reaching pre-Ike levels.

Educational Services industry has maintained the highest number of jobs by far, although it has been declining from about 14,000 jobs in 2002 to 9,400 by 2009, with the biggest loss, 1,879, in the year following Hurricane Ike. Jobs in Educational Services industry has only started to grow since 2009 up to approximately 11,000 jobs; however after three years had not reached its pre-Ike level (11,360 jobs) yet. University of Texas Medical Branch (UTMB), Texas A&M Galveston, and Galveston Independent School District are the main contributors to the Educational Services industry. UTMB in particular is one of the major employers in Galveston Island. The city's largest employer is UTMB, employing 8,000 people on the island at its hospitals, medical school and

Figure 8. Number of jobs by industry (main industries: >5% share), Galveston: 2002-11



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Retail Trade	1974	1996	1995	2047	2048	1919	1852	1715	1898	2105
Finance and Insurance	2844	2847	2703	2678	2533	2183	2189	2056	1673	1621
Educational Services	13968	13972	13270	13316	13221	11538	11360	9481	10541	11059
Health Care and Social Assistance	2578	2357	2188	2253	2917	2800	2572	1979	2503	2587
Accommodation and Food Services	3629	3485	3637	3594	4202	4233	4320	3432	4254	4561
Total	24993	24657	23793	23888	24921	22673	22293	18663	20869	21933

research laboratories. It is expected that UTMB will add more jobs with its capital expansion program and the plan for bringing a new technology company incubator to build on their research. Texas A&M Galveston campus on Pelican Island has more than 2,000 students, and like UTMB it is growing; in 2012 A&M opened a new student center and a research building (Rice, 2012).

The rest of the jobs were somewhat evenly distributed among other major industries in the beginning of 2000s with approximately 2,000-4,000 jobs per industry. However, since 2006 with the rise in Accommodation and Food Services and fall in Finance and Insurance as well as Retail Trade jobs, the differences had started growing. With Hurricane Ike, all industries lost jobs; therefore, differences diminished to various extents. Particularly Accommodation and Food Services suffered the sharpest decline with 888 jobs after Educational Services with 1,879 jobs lost in the year after Ike, while Retail Trade lost only 137 jobs. In September 2008, an estimated 500,000 fewer tourists visited Galveston than in the previous month (Angelou-Economics, 2008).

Among the five major industries displayed in Figure 8, recovery had different rates. Retail Trade, Accommodation and Food Services, and Health Care restored the level of jobs they had before Hurricane Ike hit by 2011, with Accommodation and Food Services going 241 jobs beyond the pre-Ike level. However, Educational Services and Finance and Insurance failed to restore the number of jobs to pre-Ike levels, especially Finance and Insurance jobs kept declining since Hurricane Ike. Hurricane Ike accelerated the declining trend in Finance and Insurance jobs at least initially; however it brought only a brief pause to the long-term growth of Accommodation and Food

Services. In 2007 alone, an estimated 5.4 million tourists visited the City of Galveston. With fewer than 60,000 permanent residents, the City of Galveston hosted an annual number of visitors that exceeded its own population by a factor of ninety.

Figure 9 presents the shares of five major industries in Galveston from total number of primary jobs for a 10-year period from 2002 to 2011. Changes in the share of industries from the job market of Galveston can help understand the impact of Ike on economic structure of the Island. From this figure, we can see that the share of Educational Services had been falling few years before Hurricane Ike, with the sharpest declines between 2005 and 2006 as well as 2006 and 2007.

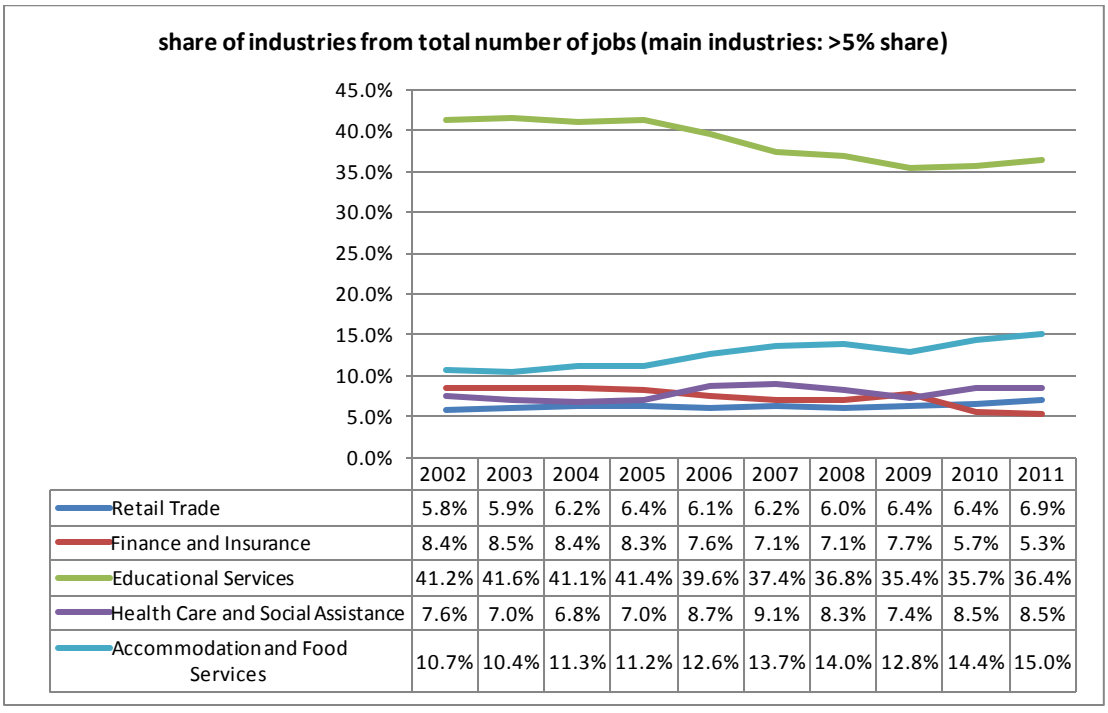
Nonetheless, Educational Services, with a share of 36.4%, had the largest share of jobs in Galveston by 2011, as it had throughout this 10-year period. The significant gap between the shares of Educational Services and the rest of Galveston economy in supporting employment on the Island demonstrates the critical role of educational institutions in keeping the local economy alive, and the lack of economic diversity in Galveston.

Hurricane Ike put 1 million square feet of UTMB campus under 6 feet of saltwater and muck, causing $710 million in damage. UTMB's John Sealy Hospital and its emergency room were swamped by Ike. The hospital's specialty doctors evacuated and scattered across Texas. At least 2,500 UTMB physicians and staffers were laid off two months after the storm, while another 600 quit. (Bosque, 2009). Consequently, the decision of whether or not to rebuild UTMB and its hospital back in Galveston, which

was unclear for approximately a year following Ike, would have had major impacts on the future of Galveston.

Ultimately, with State Legislature's decision to bring UTMB back to the Island, one of the major concerns about the broader impact of Ike on Galveston was removed. However, it is important to note that even prior to Ike, as we can see in the Educational Services and Health Care jobs trends in Figure 9, UTMB was reducing the size of its activities in Galveston. Therefore Hurricane Ike might have acted as an accelerator, or, to some extent, a justifier for a long-term regional shift in Texas medical industry.

In 2006, UTMB announced that they would have to let go 1,000 employees through layoffs, attrition and early retirement due to budget deficit while focusing resources on a specialty medical center at Victory Lakes, a well-off suburban enclave in



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Retail Trade	5.8%	5.9%	6.2%	6.4%	6.1%	6.2%	6.0%	6.4%	6.4%	6.9%
Finance and Insurance	8.4%	8.5%	8.4%	8.3%	7.6%	7.1%	7.1%	7.7%	5.7%	5.3%
Educational Services	41.2%	41.6%	41.1%	41.4%	39.6%	37.4%	36.8%	35.4%	35.7%	36.4%
Health Care and Social Assistance	7.6%	7.0%	6.8%	7.0%	8.7%	9.1%	8.3%	7.4%	8.5%	8.5%
Accommodation and Food Services	10.7%	10.4%	11.3%	11.2%	12.6%	13.7%	14.0%	12.8%	14.4%	15.0%

Figure 9. Share of industry from total number of jobs, City of Galveston: 2002-11

League City with the aim of attracting wealthier, insured patients (Bosque, 2009).

The shares of Accommodation and Food Services along with Retail Trade have been on the rise since 2005 with a short interruption by Ike only to the Accommodation industry, which include tourism businesses. Share of this industry will probably grow in Galveston's economy. After Ike several new investments were made in tourism industry including the Pleasure Pier- an estimated $60 million investment creating 650 jobs (Sjostrom, 2012). Share of Retail Trade and Finance and Insurance, unlike other industries, increased in the year following Hurricane Ike. However, for Finance and Insurance the pre-Ike falling trend was reestablished stronger by 2010.

Table VIII provides the change in shares of all industries from job market between two points related to Hurricane Ike: 2007 is the year before Ike, and 2011 marks the recovery after 3 years. It can be seen from the data in Table VIII that Finance and Insurance as well as Educational Services had the biggest drops in their shares of job market since Hurricane Ike, while Accommodation and Food Services had the biggest rise since Ike. Data from this table can be compared with the data in Figure 9, where we can see that the shares of both Finance and Insurance industry and Educational Services industry had been already falling, while the share of Accommodation and Food Services had been rising since few years before Ike. Therefore, similar to the observation on changes in number of jobs, the trends of change in shares of each industry from job market show that Ike had no impact on longer-term and broader trends in Galveston's local economy.

Table VIII. Change in shares of industries from job market: 2007-2011

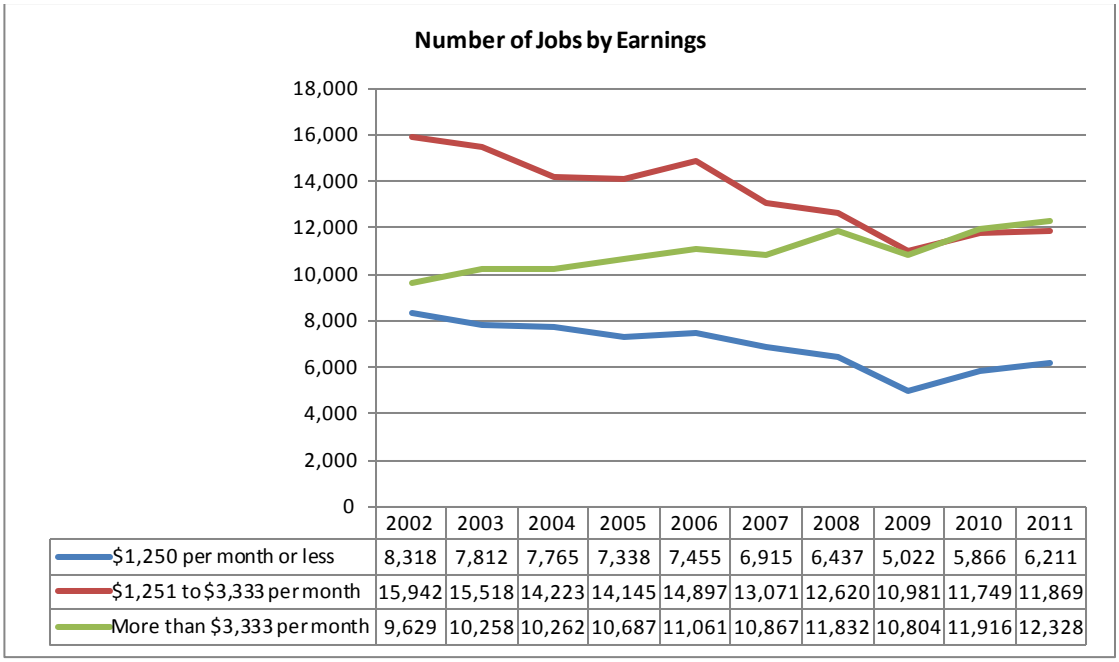
Industry	Change in share of jobs 2007-11 (% points)
Agriculture, Forestry, Fishing and Hunting	0.0
Mining, Quarrying, and Oil and Gas Extraction	-0.4
Utilities	0.1
Construction	-0.4
Manufacturing	0.5
Wholesale Trade	0.2
Retail Trade	0.7
Transportation and Warehousing	0.7
Information	-0.1
Finance and Insurance	-1.7
Real Estate and Rental and Leasing	0.4
Professional, Scientific, and Technical Services	0.1
Management of Companies and Enterprises	0.0
Administration & Support, Waste Management and Remediation	0.6
Educational Services	-1.0
Health Care and Social Assistance	-0.6
Arts, Entertainment, and Recreation	-0.2
Accommodation and Food Services	1.3
Other Services (excluding Public Administration)	-0.3
Public Administration	-0.1

Distribution of jobs by earnings

A key factor in determining the composition of jobs, as a proxy for economic structure, is earnings. Therefore, to understand the impact of Ike of economic structure of Galveston, it is important to address the question of whether and how the distribution of jobs by earning has changed after Ike. A simple trend comparison for raw numbers and shares of three job categories by earning from 2002 to 2011 was used to explore the long-term and more recent changes, as related to Hurricane Ike) in Galveston's job market.

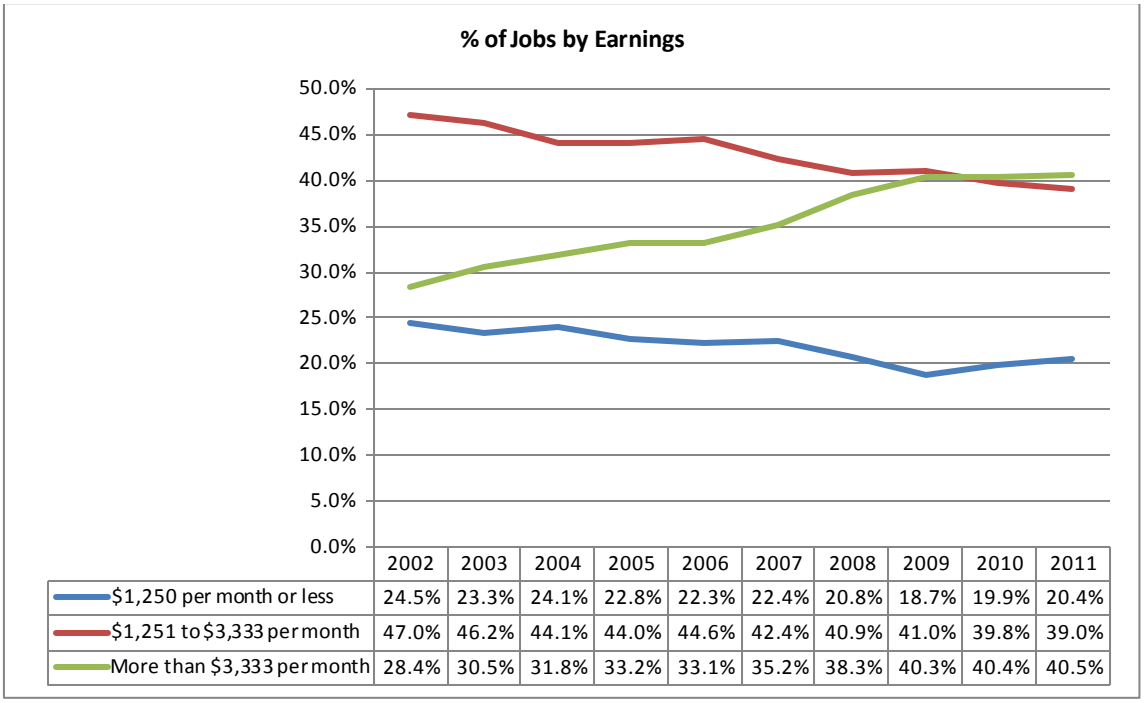
Figure 10 compares the trends of change in the number of jobs by earning from 2002 to 2011. This figure reveals that there has been a more or less steady decline in the number of jobs that earn $1,251-$3,333/month (average earning level jobs) as well as lower wage jobs, while there has been a steady rise in the number of higher paying jobs in Galveston. It is also apparent that Hurricane Ike in 2008 marked a relatively sharp decrease in the number of all types of jobs regardless of earning level. Although since 2009, all three categories started to grow as an indication of economic recovery, only the number of higher paying jobs, which was also on the rise prior to Ike, has reached and passed its pre-Ike levels.

To better understand the change in composition of jobs by earning in long term, and related to Hurricane Ike, trends of change in the share of each job category from



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$1,250 per month or less	8,318	7,812	7,765	7,338	7,455	6,915	6,437	5,022	5,866	6,211
$1,251 to $3,333 per month	15,942	15,518	14,223	14,145	14,897	13,071	12,620	10,981	11,749	11,869
More than $3,333 per month	9,629	10,258	10,262	10,687	11,061	10,867	11,832	10,804	11,916	12,328

Figure 10. Number of jobs by earnings



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$1,250 per month or less	24.5%	23.3%	24.1%	22.8%	22.3%	22.4%	20.8%	18.7%	19.9%	20.4%
$1,251 to $3,333 per month	47.0%	46.2%	44.1%	44.0%	44.6%	42.4%	40.9%	41.0%	39.8%	39.0%
More than $3,333 per month	28.4%	30.5%	31.8%	33.2%	33.1%	35.2%	38.3%	40.3%	40.4%	40.5%

Figure 11. Percent of jobs by earnings

total number of jobs were compared from 2002 to 2011. Similar to change in number of jobs, Figure 11 shows that there has been a gradual fall in the shares of average paying and lower paying jobs since 2002; the share of former category kept declining after Ike, while the latter started to increase since 2009. The order of job share has changed dramatically in the 2002-11 decade due to the gradual increase in high paying jobs and gradual decrease in average and low paying jobs. While close to half of the primary jobs paid average wages in 2002, and the other half were evenly distributed between high and low paying jobs, over a decade, Galveston's economy has changed in such a way that over forty percent of jobs are in the high paying category, less than forty percent are average earning and only twenty percent are primary lower wage jobs. Impact of

Hurricane Ike on distribution of jobs by earning was short term as the long standing trends seem to have been reestablished by 2011.

Table IX shows the absolute, relative, and share change in jobs from 2008 2011 across three earning levels. These measures of change demonstrates the level of recovery across various jobs. It can be seen in all three columns that average paying primary jobs suffered the biggest absolute, relative, and share loss after Hurricane Ike. However, one can argue that the change in composition of jobs is not due to Hurricane Ike and is part of a long-term and/or regional trend in the job market.

To distinguish between the impact of Ike and the effects of broader changes in regional economy on the changes in Galveston's job market, Table X provides a comparison of the share change of job types in the three years following Hurricane Ike among City of Galveston, Galveston County and State of Texas. Share of lower paying jobs in Galveston Island fell as it did in the State of Texas, although at a slower rate, while it rose by 0.4 in the county. The slight decrease in share of lower paying jobs in

Table IX. Change in composition of jobs by earning: 2008-2011

Jobs by Earnings	Change 2008-11 (#)	Share change 2008-11 (% points)	Change 2008-11 (%)
$1,250 per month or less	-226	-0.4	-3.5%
$1,251 to $3,333 per month	-751	-1.8	-6.0%
More than $3,333 per month	496	2.2	4.2%

Table X. Comparison of share change in job categories by earning: 2008-2011

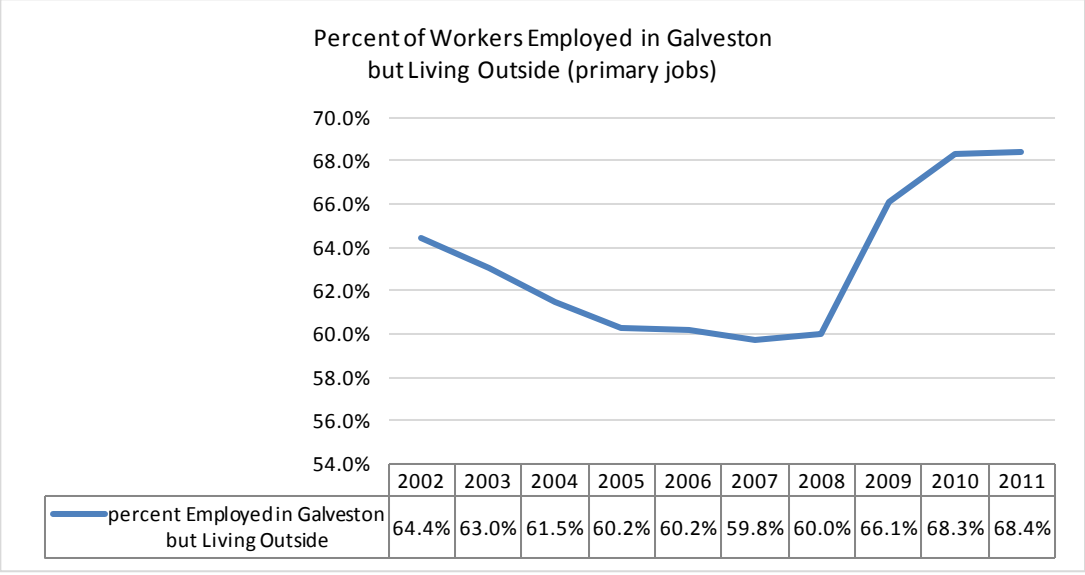
Share change: Jobs by earnings	Galveston (city)	Galveston County	Texas
$1,250 per month or less	-0.4	0.4	-1.7
$1,251 to $3,333 per month	-1.8	-1.5	-1.1
More than $3,333 per month	2.2	1.1	2.8

Galveston might be related to the impact of Hurricane Ike on port and tourism industry which provide a large part of lower paying jobs, and its difference with the State's larger rate of decline can be attributed to the larger share of industries in Galveston that provide such types of jobs compared to other areas in the State. The trend for middle income jobs was a decline across the board; however, the decline in share of these jobs was steeper in Galveston Island, perhaps as a result of decrease in Educational Services and Health Services jobs in the Island after Ike. Finally, it can be seen in the last row of the table that the rise in share of higher paying jobs was in line with the trends in the county as well as State of Texas, suggesting that regardless of the economic impact of Ike, Galveston is just following the general State wide trend of increasing the share of high paying jobs, at least in urban areas.

Inflow of workers

After exploring the impact of Hurricane Ike on the economic structure of Galveston with respect to types of jobs, it is also important to address the change in inflow of workers into the Island since Hurricane Ike. A significant component of community recovery is population recovery, which can be strongly linked to recovery of jobs. However, if the workforce chooses to live outside the community, as was the case of Galveston for many years, the link between economic recovery and population recovery would not be as strong. With population decline since decades before Hurricane Ike, even though economy had been growing, getting people who work on the Island to also live on the Island continues to pose a challenge. With Hurricane Ike and the vast damage to the housing stock, this challenge grew more serious.

Inflow-Outflow analysis based on LODESdata was used to examine whether and how the ratio of workers who live off the Island (inflow) has changed since Hurricane Ike. Figure 12 illustrates the trend in percentage of workers inflow to Galveston from 2002 to 2011. Percentage of workers that commuted to work in Galveston had been gradually falling from over 64% in 2002 to 60% right before Ike hit the Island. From 2008 there is a very sharp rise in workers' inflow to over 66% and it continues to increase until 2011, although at a slower rate, which might suggest stabilizing at a new normal level. A survey of employers by Galveston Economic Development Partnership (GEDP) showed that half of those employed in Galveston lived off the island before the storm. The corresponding number after Ike was 53 percent. While both of these estimates are lower than what LEHD data provides, the trend they present is consistent with that data (Rice, 2012).



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
percent Employed in Galveston but Living Outside	64.4%	63.0%	61.5%	60.2%	60.2%	59.8%	60.0%	66.1%	68.3%	68.4%

Figure 12. Percent of Workers Employed in Galveston but Living Outside (primary jobs)

Even though major economic engines are successfully recovering from Ike and adding more jobs, the rate of those workers leaving Galveston may also be increasing, posing a challenge to the City in providing the tax base and receive federal funding for community development. For example, UTMB expects to add 1,000 jobs by 2020; however, only 25 percent of those workers were expected to live on the Island. That's the same percentage of UTMB employees living in Galveston in 2012 (Rice, 2012). The city needs a population of at least 50,000 to continue getting the level of federal aid it received before the storm. Lack of affordable housing and shopping centers, expensive insurance rates, strict building codes on the coast and scattered vacant lots across the Island, that make investment in new development less attractive, and a fading perception of low-performing schools were among the major reasons that workers, especially UTMB and other middle income employees fail to remain on the island.

Housing recovery

Average assessment values by housing type

This analysis starts with examining average assessment values for each type of housing. Table XI compares the average assessed value by housing type from 2008 to 2012 for the entire sample, and the relative gain or loss from the respective 2008 averages. The average assessed values are also displayed in Figure 13. Comparing averages across the three residential types reveals disparities in both average damage and relative recovery trajectories among different housing types.

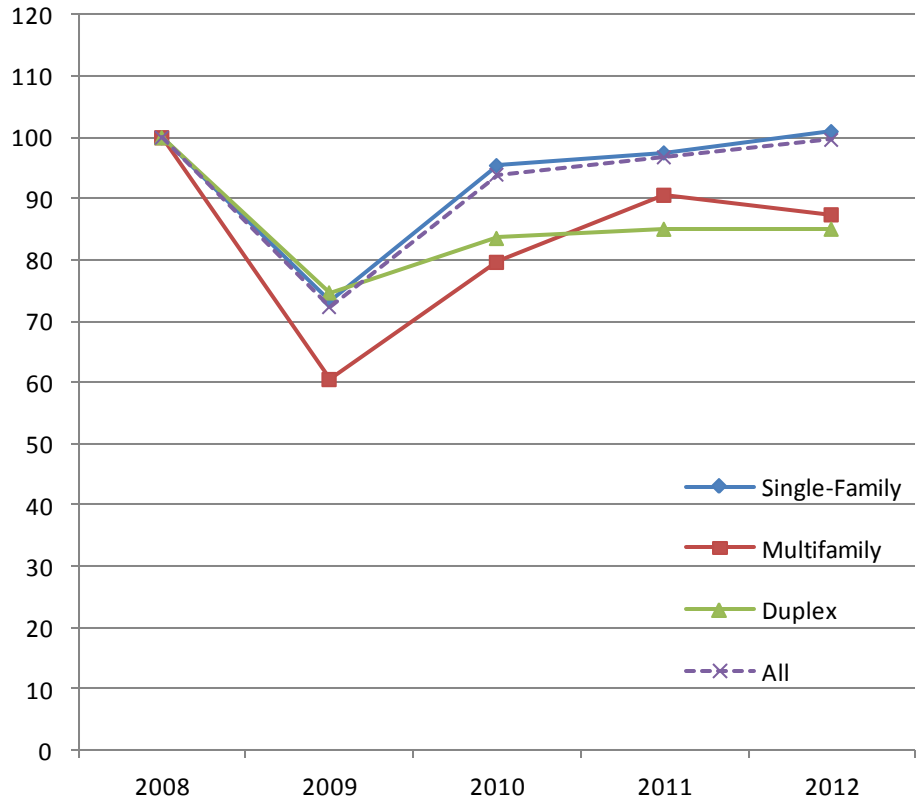


Figure 13. Percent Change from 2008 Assessed Value for each Residential Type

Comparing the 2009 to 2008 averages clearly indicates that on average all housing types lost assessed value due to Ike. Examining the relative change also indicates that multifamily properties suffered the greatest relative loss in assessed value (-39.45%), and hence, suffered higher levels of relative damage on average when compared to the other two forms of housing. The average relative losses for single-family and duplexes are quite similar.

Table XI. Average assessed value by housing type, 2008-2012 only Galveston

Year	Single-Family		Multifamily		Duplex	
	Average value	change from 2008	Average value	change from 2008	Average value	change from 2008
2008	$117,662		$225,283		$135,869	
2009	$86,348	-26.61%	$136,408	-39.45%	$101,474	-25.31%
2010	$112,306	-4.55%	$179,471	-20.34%	$113,544	-16.43%
2011	$114,741	-2.48%	$204,128	-9.39%	$115,573	-14.94%
2012	$118,831	0.99%	$196,949	-12.58%	$115,595	-14.92%

In general, the average assessed values begin to rebound following their lows in 2009, however the rates of these rebounds are quite different. The averages for single-family structures rebounds quickly by 2010, and then slowly surpasses the 2008 average, albeit barely, by 2012. Multi-family structures, also fall dramatically in 2009, but then rather quickly rebound for the next two years, but then, perhaps surprisingly, fall back in 2012, failing to reach the restoration levels on average. This fallback, was due to the fact that some multi-family developments were razed between 2011 and 2012. Thus, multifamily complexes failed to reach the restoration levels, on average, even after four years, with their average assessed values being 12.6% lower than their pre-Ike level. The recovery trajectory for duplexes is simply lethargic. While average losses for duplexes were initially comparable to those of single-family structures, they experienced a smaller return toward their 2008 assessed values in 2010. However, after that point they experienced little if any gain, finishing at roughly 15% below their 2008 average values

by 2012. On the whole, when simply comparing average assessed values, only single-family structures reached restoration levels, with both multifamily and duplexes lagging significantly. These results indicate that duplex and multifamily properties had significantly slower rates of recovery and restoration. These trajectories are also displayed in Figure 13. Percent Change from 2008 Assessed Value for each Residential Type. As can be seen, only single-family structures returned to their 2008 average assessed value by 2012, while multifamily and duplexes lagged significantly.

Restoration time

While a comparison of average levels of assessed values allows for rather coarse assessment of recovery, the use of averages can obscure a good deal of variation in recovery trajectories within each housing type. Restoration time can be used to examine the variability among types of housing with respect to the number of years it took for each housing unit to reach back to its pre-Ike appraised value and either keep it or increase it.

Table XII presents the numbers and percentage of each housing type that reached the restoration levels by 2010 (2-years), 2011 (3 years), 2012 (4 years) or failed to reach its 2008 assessed value by 2012 (failed to restore). Needless to say, if a structure was not damaged (i.e. suffered no assessed value loss between 2008 and 2009), then it is not included in this assessment.

The findings emergin from the results presented in Table XII are with consistent previous discussion, but provide a much more comprehensive picture of what was happening within each type of housing. By two years after the storm, just over 49% of single-family structures have reached restoration levels, and just over 9% more reach these levels in the following two years. However, 41% of single-family housing failed to even reach restoration levels by 2012, four years

Table XII. Number and percent of damaged houses reaching restoration levels for each housing type Only Galveston

restoration time	single-family		multifamily		duplex	
	N	%	N	%	N	%
2 years	8757	49.56	229	27.33	21	16.80
3 years	866	4.90	39	4.65	4	3.20
4 years	739	4.18	11	1.31	5	4.00
failed to restore	7309	41.36	559	66.71	95	76.00
Total	17671	100.00	838	100.00	125	100.00

after Ike. Similarly, the percentages of multifamily and duplex structures reach restoration levels by 2010 at 27% and 17% respectively. However, very small numbers of both groups reach restoration levels in the subsequent years, leaving approximately 67% of multifamily and 76% of duplexes failing to reach restoration levels even by 2012. These results indicate that regardless of type of housing, most of those that were going to be restored, were restored by two years after the storm, but sizable percentages of all housing failed to do so even after four years. For duplexes and multifamily

housing complexes the vast majority of these structures failed to be restored even four year after the storm, and almost half also failed to be restored.

Average assessment values by the levels of damage and housing type

To better understand the consequences of damage for housing recovery, the average assessed housing values were reexamined, by housing type, after categorizing each type into one of three levels of damage, less than 15%, 15-50% or greater than 50% based on the percent of assessed value a structure lost between 2008 and 2009. Table XIII presents the results of this analysis, but to make their interpretation easier, each value has been divided by its respective 2008 assessed value. Hence, values of 1 or greater imply restoration has been met, while values less than one indicate that restoration has not been achieved.

Beginning first with the upper panel of this table, which has data for all three types of housing that suffered relatively little damage, one can clearly see that single-family structures on average regained their 2008 assessed values by 2010, surpassing it slightly and then finish the period a 1.07, or 7% higher than their 2008 assessment. Multifamily structures also regain and slightly surpassed their 2008 average by 2010, but fell back slightly in the remaining two years. This again reflects that some of these structures were razed rather than repaired. A somewhat similar pattern holds for duplexes that suffered minor loss. They nearly reached their pre-Ike average assessed values at 96%, but also experience a slight fall back as some of these structures were also razed.

Table XIII. Indexed average appraised values of single-family, multifamily and duplex houses before and after hurricane Ike, by extent of damage. Only Galveston

minor damage: loss <15%			
Indexed Average Improvement value	Single-family	multifamily	duplex
2008	1.00	1.00	1.00
2009	0.92	0.89	0.90
2010	1.01	1.03	0.96
2011	1.03	1.00	0.96
2012	1.07	0.99	0.93
moderate damage: 15% <=loss <50%			
Indexed Average Improvement value	Single-family	multifamily	duplex
2008	1.00	1.00	1.00
2009	0.71	0.71	0.71
2010	0.95	0.87	0.80
2011	0.97	0.97	0.82
2012	1.01	0.91	0.82
extensive damage: loss =>50%			
Indexed Average Improvement value	Single-family	multifamily	duplex
2008	1.00	1.00	1.00
2009	0.22	0.25	0.22
2010	0.49	0.53	0.38
2011	0.60	0.70	0.44
2012	0.72	0.73	0.50

- Indexed according to 2008 value

Moderately damaged multifamily and duplex structures generally failed to reach their pre-Ike average appraised values by 2012, but multifamily structures were quite close to restoration on average by 2011, falling back slightly in 2012. Moderately damaged duplexes did not fare as well as those with only minor damage, in that they did not get as close to reaching their restoration levels. Indeed, by 2011 they on average get closest to their 2008 average appraisal values at 82% of their re-Ike values. The only moderately damaged housing types that reach restoration levels on average are single-family structures.

In general parcels that suffered extensive damage failed to restore to their pre-Ike assessed values even after four years. The patterns for single-family and multifamily housing are quite similar, showing consistent gains of, but reaching just over 70% of their average pre-Ike values by 2012. However, extensively damaged duplex properties show a much flatter trajectory, reaching to just 50% of their average pre-Ike values on average. On the whole, these findings indicate that the consequences of damage are quite dramatic and long-lasting, particularly at higher levels of damage. Restoration times are much slower for heavily damaged structures.

To sum, the most striking observation to emerge from the data analysis was that recovery of Galveston and Bolivar has either failed or has been severely thwarted which stands in contrast to the literature as well as with minimal quantitative analysis that has examined housing recovery which generally held that recovery should occur within two to three years particularly with respect to single-family housing, with a lag for multi-family structures. This observation holds whether considering aggregate and disaggregated data. At the aggregate level, average assessed multifamily and duplex failed to reach their pre-Ike average values in Galveston even after four years and those for single-family structures just did make these levels. Furthermore, when examining restoration timing, Substantial percentages of single-family, multi-family and duplexes that sustained damage, failed to reach their restoration levels even four years after the event.

Assessing the relationship between social vulnerability and damage and recovery of parcels

Extent of damage as well as recovery of different housing types might vary due to effects of socioeconomic factors which are not accounted for by the average patterns. The fact that on average single-family houses and multifamily complexes with minor damage returned to their pre-disaster levels two years following Hurricane Ike, while duplex houses failed to do so even after four years, might merely be a result of variability in social vulnerability rather than signaling a difference among types of housing. Understanding the relationship between social vulnerability and rate of housing recovery can help planners and policy makers to better target disaster preparedness resources and activities. Nine measures related to social vulnerability are summarized at block group level and their associations with damage and recovery are assessed at the parcel level.

Analysis presented below examines the neighborhood characteristics that the literature suggests can influence housing recovery patterns. Specifically in this analysis nine measures related to social vulnerability are summarized at block group level and their associations with damage and recovery are assessed at the parcel level. The first two are related to race/ethnicity: percent Hispanic and non-Hispanic Black populations. The other measures are related to the capacity for obtaining recovery resources: renter-occupied status at parcel level, percent of the block groups' housing that is mobile home, percent of the block groups' population in poverty, percent of adult population without high school education, percent of population above 65 years old, percent of unemployed

labor force, and percent of population who do not speak English well. These social vulnerability measures were all obtained from the U.S. Census Bureau (2009 5 years American Community Survey for 2005-2009) at the block group level (except for the renter-occupied status that was obtained from tax appraisal dataset) and spatially linked to the residential parcels located within each block-group. Based on the existing social vulnerability literature, I expected these measures to have negative consequences for restoration time as well as rate of recovery.

Table XIV lists a description of each variable, along with its average and standard deviation. Not surprisingly, given the discussion above, two of the three recovery variables for all types of residential parcels have negative averages, although they barely surpass zero with time. The 2008-10 recovery measure has an average of -4.43% indicating that on average these residential structures were 4.43% below their 2008 values in 2010. By 2011 the average rises to -1.84% and it rises still further to 0.84% in 2012, therefore on average residential structures were .84% above their 2008 values in 2012. The fact that the standard deviations get larger for each of these measures, indicate greater variation in recovery through time as well. The average damage for all residential structures in Galveston was 30.04%, indicating the average loss in assessed value of a residential property between 2008 and 2009.

In total, 51% of residential structures are renter-occupied, which is a very high percentage relative to many communities. On average 2.97% of occupied housing units did not have a telephone and 0.57% of them were mobile homes. The range for the latter is pretty narrow, with a maximum of 13.48% in Galveston. These residential structures

are located in neighborhoods that are 13.24% non-Hispanic Black and 23.74% Hispanic, on average. However, there is considerable variation in racial compositions, with the percentage non-Hispanic Black ranging from 0 to72.2% and Hispanic from 0 to78.3%. The average for neighborhood poverty was 16.14%, unemployment was 33.71% and adults without a high school diploma, 16.14%. Just as with racial/ethnic compositions, these also had considerable ranges from very low levels to rather high concentrations of unemployment (73.23%), poverty (62.08%) and adults without a high school diploma (55.93%). Average percentage of population older than 65 was 16.07% with a maximum of 55.06% and 4.45% of neighborhoods' population could not speak English well with a maximum of 32.19%.

To understand the relationship between housing damage and recovery and the SV indicators, partial correlations were examined between damage as well as recovery with the neighborhood socioeconomic attributes listed in Table XIV. The partial correlation between damage and each neighborhood socioeconomic variable estimates the correlation that would be observed between damage and each neighborhood variable after controlling for the other neighborhood attributes in the list correlation matrix. Table XV provides the results of the partial correlation analysis.

Table XIV. Definitions and descriptive statistics for variables used in correlation analysis- Only Galveston

Variable name	Description	Mean	St. Dev.
Recovery08-10	Percent value change between 2008 and 2010 appraisals*	-4.43	47.45
Recovery08-11	Percent value change between 2008 and 2011 appraisals**	-1.84	52.38
Recovery08-12	Percent value change between 2008 and 2012 appraisals***	0.84	56.53
Damage	Percent value loss between 2008 and 2009 appraisals	30.04	23.72
Renter-occupied	Parcels without homestead exemption (dummy)	0.51	0.50
Mobile home	Percent mobile home	0.57	1.927
Black	Percent non-Hispanic Black	13.24	17.68
Hispanic	Percent Hispanic	23.74	19.10
Poverty	Percent in poverty	16.14	12.41
No high school	Percent without high school degree	16.14	14.08
No telephone	Percent occupied housing units without a telephone	2.96	4.92
Unemployment	Percent of Labor force unemployed for age above 16	33.71	9.45
Speak English not well	Percent Speak English not well or not at all	4.45	5.99
Elderly	Percent population above 65	16.07	9.12

* $((\text{imprv. value}_{2010} - \text{imprv. value}_{2008})/ \text{imprv. value}_{2008})*100$; ** $((\text{imprv. value}_{2011} - \text{imprv. value}_{2008})/ \text{imprv. value}_{2008})*100$;

*** $((\text{imprv. value}_{2012} - \text{imprv. value}_{2008})/ \text{imprv. value}_{2008})*100$

Damage presents significant positive associations with six of neighborhood social vulnerability indicators, including mobile home, minority status (Black and Hispanic), lack of telephone connection, unemployment and lack of language communication skills. Therefore, residential parcels in neighborhoods with higher percentage of mobile homes, concentrated minority population, more units without a telephone, concentration of unemployed residents, and those without adequate English skills, suffered higher relative value losses following Hurricane Ike.

Table XV. Partial correlations of damage with neighborhood characteristics

	Damage (% loss)
Renter-occupied	-0.0136
Mobile home	0.1070**
Black	0.1406**
Hispanic	0.1078**
poverty	-0.0489**
Occupied housing units without a telephone	0.0385**
Educational attainment less than high school	-0.0731**
Labor force unemployed for age above 16	0.0882**
Speak English not well or not at all	0.1068**
Elderly	-0.0192**

Sources: American Community Survey 2009 5-year estimates

* indicates two-tailed significance at $p < 0.05$. ** indicates two-tailed significance at $p < 0.01$.

Correlation coefficients for mobile home, minority and inadequate language skills are larger than other correlations indicating a stronger relationship these three social vulnerability factors have on increasing the level of damage houses received. The significant negative correlations between damage and poverty as well as lower education level and older population are surprising. Because they suggest that damage was less in areas with higher poverty, lower levels of education and higher concentrations of elderly, which is counter to SV expectations.

It is expected that housing in socially vulnerable neighborhoods have more difficulty restoring to their pre-storm appraised value due to both higher levels of damage (Highfield et al., 2010) and limited access to recovery resources (Van Zandt et al., 2012). Table presents partial correlations between restoration time (number of years it took damaged houses to restore their pre-Ike value) and each social vulnerability indicator, while effects of all other listed social vulnerability indicators on restoration time are removed.

There were significant positive partial correlations between restoration time and renter-occupied status of a parcel, and mobile home, non-Hispanic Black population, lack of telephone connection, and unemployment in the neighborhood. Percentage of non-Hispanic Black population has the largest significant positive correlation with restoration time, meaning that it took a particularly longer time for houses in neighborhoods with higher concentration of renter-occupied housing and Black population to restore to their pre-Ike appraised value. Similar to the correlation analysis for damage, significant negative correlations between restoration time and poverty as well as concentration of older population are surprising. On the whole, it should be noted that whether discussion negative or positive correlations, all of the correlations in this table are very small to marginal in magnitude, suggesting that much else is driving recovery beyond SV issues.

Social vulnerability of neighborhood is suggested to have an adverse effect on access to recovery resources and also on short-term measures of recovery actions such as applying for recovery funds, having insurance, and applying for repair/rebuilding

Table XVI. Partial correlations of restoration time with:

	Restoration time (# years)
Renter occupied	0.0590**
Mobile home	0.0593**
Black population	0.1042**
Hispanic population	0.0000
Persons in poverty	-0.0810**
Occupied housing units without a telephone	0.0506**
Educational attainment less than high school	-0.0071
Labor force unemployed for age above 16	0.0378**
Speak English not well or not at all	0.0017
Elderly	-0.0597**

Sources: American Community Survey 2009 5-year estimates

Table XVII. Partial correlations of recovery rate with …

	Recovery 2008-10	Recovery 2008-11	Recovery 2008-12
Persons in renter occupied housing units	-0.0096	-0.0015	-0.0003
Mobile home	-0.0323**	-0.0314**	-0.0214**
Black population	-0.0193**	-0.0200**	-0.0368**
Hispanic population	-0.0011	-0.0008	-0.0179*
Persons in poverty	0.0133	0.0173*	0.0160*
Occupied housing units without a telephone	-0.0105	-0.0099	-0.0261**
Educational attainment less than high school	-0.0039	-0.0041	-0.0061
Labor force unemployed for age above 16	-0.0012	0.0028	-0.0071
Speak English not well or not at all	0.0024	-0.0045	0.0077
Elderly	0.0087	0.0085	0.0085

Sources: American Community Survey 2009 5-year estimates

* indicates two-tailed significance at $p < 0.05$. ** indicates two-tailed significance at $p < 0.01$.

permits (Highfield et al., 2014; Peacock etal., 2014; Van Zandt et al., 2012). Table XVII presents partial correlations of three measures of recovery (2-year recovery, 3-year recovery and 4-year recovery) with each social vulnerability indicator; while the effect of all other listed indicators on recovery are removed.

Percentage of mobile home and proportion of Black population are negatively correlated with rates of short-term (2-year), mid-term (3-year), and long-term (4-year) recovery. Since mobile home has a limited range in Galveston's neighborhoods, Black population seems to be the main factor associated with lower rates or recovery. Interestingly, Hispanic population and lack of telephone communication are negatively correlated only with long-term rate of recovery.

As it was the case with damage and restoration time, it is surprising that neighborhood poverty presents a positive significant correlation with rates of recovery between 2008 and 2011, as well as between 2008 and 2012. This rather surprising

finding for poverty is quite different than that which would have been expected by the literature. The unexpected association might be related to the generally slow progress of housing recovery, substantial loss of White population and increase in the proportion of individuals who live off the Island although they work on the Island, which were all discussed in previous sections.

Conclusion

This study set out to analyze post-Ike recovery trends in population, economy and housing in three different ways. First, I compared pre-Ike to post-Ike rates of change for total population, economic structures in terms of jobs, and inflow of workers. Second, I examined whether or not each dimension in the study has reached restoration level (*i.e.* restored its pre-Ike level). Third, I compared the losses or damage, restoration, and recovery trajectories of the various segments of population (races/ethnicities and block groups), economy (industries), and housing (residential types).

Three major themes emerge from this study. First, pre-Ike trends in population (decline), number of jobs, and inflow of workers were either temporally accelerated (if declining pre-Ike such as Finance and Insurance jobs) or paused temporally (if growing pre-Ike such as jobs in Accommodation and Food Services). Second, recovery from Ike in Galveston has been very slow in terms of population return, bringing jobs back, and housing recovery. Nevertheless, while the picture is particularly bleak with respect to housing, some downward trends were stopped, as in population and job loss, however it is difficult to say that restoration levels have been achieved across the board.

CHAPTER V

CONCLUSION

The overarching question of my dissertation was "how can recovery planning processes and the nature of long-term recovery following Hurricane Ike in Galveston inform theories of community planning processes in general and recovery planning in particular to improve recovery processes?" This inquiry was addressed in three articles with more specific questions. The first article engaged in an integrative literature review examining theories of community planning, the newly emerging literature on post-disaster recovery planning, Federal guidelines for post-disaster planning, and the general literature on community recovery. The second article undertook a qualitative case study analysis of the post-Ike recovery planning process in Galveston, Texas. Finally, the third article engaged in a quantitative analysis and assessment of recovery at the community level, examining important dimensions of the community including its population, economy, businesses, and housing. In the following pages the major findings of each article are summarized and synthesized in relation to the other two articles to draw lessons for both recovery planning practice and research.

What I Found in the First Article

In the first article, I presented an integrative review of the emerging recovery planning literature along with the theories of planning and plan quality to lay out a set of evaluation criteria of what is a good recovery planning process and what is a good recovery plan. Then I applied the resulting criteria from distillation of these bodies of

literature to evaluate and critique federal policies for recovery planning. There is some degree of consensus among the authors whose work I reviewed that a successful recovery planning process (pre- and post-impact) should:

- Be proactive
- Be based on accurate data and sound analysis
- Be a local responsibility, based on local needs
- Have a long-term focus and broad scope
- Be driven by strong local leadership
- Involve diverse voices
- Establish collaboration and cooperation
- Recognize and build consensus around conflicting issues
- Aim at capacity building
- Adapt and evolve with new input
- Integrate vulnerability analysis and involve vulnerable citizens

General plan quality studies, recovery planning guides from planners and disaster researchers (for example American Planning Association, PAS report # 567), and more recently recovery plan quality studies all offer insights about the features and elements of a recovery plan. My summary of these insights includes two aspects of a plan; setting a clear direction and establishing the use of the plan. A successful recovery plan sets a clear direction for recovery efforts through:

- Goals that are transformative and restorative; (e.g. Pre- and post-disaster mitigation)

- A fact base of alternative plausible futures, precise anticipation of the consequences of a disaster, projections of all possible direct and indirect losses
- Flexible policies
- A successful recovery plan should also establish its uses and influence through documenting:
- Interorganizational coordination and agreements to adapt to change after a disaster
- Participation practices to engage the public before and after the disaster event
- Implementation and monitoring details to track actions and evaluate and adapt policies

I reviewed the federal recovery policy in light of the principals suggested by research. The two major federal policy documents that focus on disaster recovery planning are first, the Long Term Community Recovery (LTCR) program by FEMA under the ESF#14 in NRF and second, the NDRF which replaced ESF#14, particularly Community Planning Capacity Building (CPCB) Recovery Support Function (RSF).

LTCR planning is action-oriented and should support existing planning efforts in the community. LTCR program was designed to help communities manage their recovery process without a pre-disaster recovery plan, therefore it has a very practical and outcome-oriented approach (i.e. recovery projects, not to be confused with recovery outcomes). Several key principles of recovery planning suggested in the literature were

echoed in LTRC program. But there are issues that were not in line with research findings.

Even though LTCR program was designed based on the premise that taking the time to move through its process allows the community to make the most of the opportunities created by the recovery process, there was not enough time and capacity designated for deliberation, consensus building and sound information analysis under the LTCR program. 6 to 12 weeks does not seem to be a reasonable time for developing a coherent recovery strategy, engaging the public, and building partnerships, even in a timely manner. In such short time frame, reaching some of the LTCR steps above seem very difficult, if not impossible, as documented in of case study of Galveston.

LTCR was aimed at helping communities produce a project-oriented plan. This approach in itself hindered a comprehensive approach to recovery and all the data collection and analysis that must support every planning decision in a plan. The project-oriented approach of LTCR can be a result of the short-time frame during which some tangible outcomes and directions would be expected from the community and is essential to the continued trajectory of recovery. In other words, a planning process if perceived as successful, can set the community for success in recovery. The final outcome of LTCR support is a list of projects with specified priorities that should lead the communities' recovery. Prioritizing recovery projects in the way suggested by the project ranking tool provided by FEMA was shown to be both confusing and leading to unrealistic expectations.

LTCR continued to evolve until 2011 when its work helped catalyze the development of the National Disaster Recovery Framework (NDRF). ESF #14 transitioned to the Community Planning Capacity Building Recovery Support Function. NDRF marks an improvement from ESF#14 in the following ways. The support provided by FEMA under NDRF will be more focused on recovery issues and continuous, compared to LTCR program. Key ESF #14 concepts are expanded in the NDRF and include recovery-specific leadership, organizational structure, planning guidance and other components needed to coordinate continuing recovery support to individuals, businesses and communities.

NDRF marks a shift in federal recovery policy toward putting more emphasis on pre-disaster recovery planning and building capacity for recovery in communities. Unlike LTCR, the NDRF planning RSF support advance recovery planning. Under NDRF with FEMA's support, relevant stakeholders and experts are brought together during steady-state planning and when activated post-disaster to identify and resolve recovery challenges. ESF14's approach to designing the process was more prescriptive with a number of steps but NDRF is more flexible stating that each community determines its process. Also, NDRF's approach to recovery planning is more proactive and mitigation-oriented than the NRF ESF#14. "Community Planning and Capacity Building RSF" has an emphasis on integration of hazard mitigation throughout the continuum of pre- and post-disaster recovery planning and implementation.

NDRF has changed the time frame of planning too. Whereas the ESFs typically operate within a time span of weeks and months, the Community Planning and Capacity

Building RSF operational timeframe is months to years. Finally, NDRF incorporates an integrative approach to recovery planning. It integrates mitigation, recovery and other pre-disaster plans and activities into existing planning and development activities.

What I Found in the Second Article

Qualitative analysis was conducted on data collected through semi-structured interviews as well as secondary data including media reports and public documents. In general, the goals of this analysis were to understand how Galveston's post-Ike recovery planning process took place and progressed, as well as strengths and weaknesses that emerged during that planning process. Another goal for my qualitative analysis was to examine whether or not the case of planning in Galveston informs further the issues that emerged in the first article and what does it add to our knowledge of challenges in recovery planning as well as how to improve it.

Looking back at their post-Ike planning experiences after four years, my study informants discussed their insights and challenges in recovery planning and what they would want or do differently if a similar event occurred. All informants emphasized need for planning before the disaster and more deliberation and conflict resolution in the planning process. Successes and failures of LTCR planning process in Galveston provides lessons for other communities that are thinking about or already planning for disaster recovery.

Galveston showcases community engagement and cooperation after Ike. Processes of cooperation and engagement comprised positive aspects like empowerment, sense of ownership, optimism, unity, and negative aspects like ignoring conflicts,

accepting every idea without consensus building, rush and little deliberation, and limited support from authorities. The positive and negative consequences are detailed below:

+ The strong bottom-up community involvement and transparency which was vital for the support and credibility of this process in the community.
+ Providing the opportunity for citizens to have a voice in the recovery decisions.
+ The wide community engagement as an opportunity for better planning following a disaster since it may not be easy to attract wide public participation in normal time planning.
— Failing to develop a realistic and consensus based vision for future that is supported by key policy makers.
— Failure to have the recovery plan adopted by the city council.
— Failure to support bottom-up decisions by the local government and federal aid providers resulting in many if not most of the 42 projects presented by the Long-term Recovery Committee remaining unimplemented.
— The hope embedded in recovery initiatives decided by the community, giving way to cynicism and distrust especially in the local government.

A few of the features that previous research suggests for recovery planning process were found in LTRC process in Galveston. Those principals include local control on the planning process (Galveston Style), thinking about a broad range of possible improvements in a long time frame while planning for recovery (several long-term infrastructure projects in LTRC plan), giving a voice to a diverse group of citizens in a transparent and inclusive process (LTRC community support and engagement).

Several of the features of planning process suggested by previous research were not found in the LTCR process and as a consequence introduced a number of challenges. Since there was not sufficient time and expertise for data collection and analysis, several of the recovery projects proposed by the LTRC were study projects rather than actions. Also without sound data, LTCR failed to propose alternative long-term recovery scenarios and mitigation strategies that could receive community by-in. Lack of strong local leadership and even involvement in the LTRC process was also found to be one of the major challenges toward approval, adaption and implementation of the plan. Implementing recovery plan also needs establishing collaboration among various aid providers, government agencies, non-profit organizations, charities, etc. as part of the planning process. In general, the LTRC plan fails to provide specific and studied proposals for implementing the recovery projects, especially the financial resources.

The reactive and prescriptive approach of FEMA's LTCR program and lack of an existing recovery planning process in Galveston, made it very difficult to achieve some of principals of success suggested by previous studies which reinforce the importance of these principals; including capacity and consensus-building, involving vulnerable citizens in planning and evolving with new input. The bottom-up community engagement in the LTRC process revealed not only the benefits of giving a voice to residents but also the conditions needed for such process to succeed. Community engagement needs support from local leadership and planning expertise. Community engagement cannot and should not replace the planning process; it should be one of several elements of recovery planning.

What I Found in the Third Article

This article presented a quantitative measurement of recovery in Galveston, Texas following Hurricane Ike (2008) with two purposes. First, I developed a measurable definition that integrates significant aspects of recovery. Second, I quantified community recovery to describe empirical patterns of population, economic and housing recovery.

At aggregate level, **population** of Galveston is recovering, although slowly, and the general trend in decline has at least in the short run been turned. Galveston has been on a steady declining population trend since 1960s. Annual population estimates show that Hurricane Ike marked a sudden increase in the long-term decline population trend. 53 out of 71 block groups in Galveston and Bolivar lost population between 2005-09 and 2009-13 estimation periods. The maximum population loss was 787 individuals for one block group, and the largest relative population loss was 54.7%. Both the block groups that suffered the highest population losses and those with population growth are located in the east side of Galveston. Neighborhoods adjacent to Seawall (on the south side of Urban Core) and the ones closer to Galveston Channel suffered relative population losses as high as 55%.

Several of my interviews thought population loss is one of the major challenges that Galveston has had to face a long time before Ike but ignores. Slow population return and even continued population loss after Ike may well be linked to lack of a strong vision and misunderstanding of priorities in (recovery) planning. Recovery planning by LTRC started by setting a vision for Galveston that emphasized sustainability and

resilience in the face of future disasters, however issues that Galveston had been struggling with prior to Ike were not (well) integrated in the visioning of LTRC. It can be argued that the committee was thinking about ideals Galveston could achieve post-recovery from Ike. While a few of the projects proposed in the LTRC plan were concerned with recovery from Ike, majority of them were targeting beyond the urgent recovery issues and even pressing development issues such as population decline.

I found disparities in population loss and recovery among the four major racial/ethnic categories[5]. During the first three years following Ike, Anglos experienced the largest absolute population loss but Blacks suffered the largest relative population loss. In a longer time frame, only White population has left the Island and the other racial/ethnic populations have experienced minor changes. The later return of Black population could be due to the progress of housing recovery program, even though very slow, in rebuilding damaged low to moderate income housing.

The **economic recovery** of Galveston signifies the role of educational institutions (UTMB, Texas A&M Galveston and Galveston Community College) in keeping the local economy alive on the one hand and the lack of economic diversity in Galveston on the other. Hence, fate of the entire recovery of Galveston was to large part depending on the (top-down) decision from the State Legislature whether or not to bring UTMB back to Galveston. Even though the decision was in favor of Galveston, UTMB was reducing the size of its activities in Galveston. Therefor Hurricane Ike might have acted as an accelerator or to some extent a justifier for a long-term regional shift in

[5] Hispanic, not-Hispanic White, not-Hispanic Black, not-Hispanic other

Texas medical industry. The trends of change in shares of each industry from job market show that Ike was only as an interruption and acceleration to longer-term and broader trends in Galveston's local economy.

Finance and Insurance as well as Educational Services had the biggest drops in their share of job market since Hurricane Ike (slowest recovery), while Accommodation and Food Services had the biggest rise since Ike (fastest recovery). Tourism-related industries have recovered pretty well from the damages and losses of Ike. The shares of Accommodation and Food Services along with Retail Trade have been on the rise since 2005 with a short interruption by Ike only to the Accommodation industries which largely include tourism businesses. While tourism businesses were prepared for recovery with respect to financial resources, tourism in general was also an important focus of the LTRC process. projects such as "Take a Seat", "Historic Preservation", "Feasibility Study of Gambling", etc. were targeted at seizing the opportunity of tourist attractions specially the beach and historic homes and art shops in the Strand Area for boosting Island's economy.

While number of all jobs by earning categories started to grow since 2009, as an indication of economic recovery, only the number of higher paying jobs, which was also on the rise prior to Ike, have reached and passed its pre-Ike (2008) level. Average paying primary jobs suffered the biggest absolute, relative and share loss after Hurricane Ike. However, the change in composition of jobs is part of a long-term and/or regional trend in the job market rather than Hurricane Ike.

Tourism has recovered and is growing in Galveston, but the number of low paying primary jobs will probably continue to fall with the shortage of affordable housing and the anecdotal evidence that suggest a rise in number of non-primary low-wage jobs and workers that have to work two or more jobs to meet their needs. Even though major economic engines are successfully recovering from Ike and add more jobs, the rate of those workers living off the Island is also increasing, posing a challenge to the City in providing the tax base and receiving federal funding for community development.

Recovery of housing in Galveston and Bolivar has either failed or has been severely thwarted in its level of housing recovery, which stands in contrast to the literature as well as with minimal quantitative analysis that has examined housing recovery. Previous studies generally held that recovery should occur within two to three years particularly with respect to single-family housing, with a lag for multi-family structures. However in Galveston, substantial percentages of single-family, multi-family and duplexes that sustained damage, failed to reach their restoration levels even four years after the event. At the aggregate level, average assessed multifamily and duplex failed to reach their pre-Ike average values in Galveston even after four years and those for single-family structures just did make these levels.

Recommendations

For practice

Challenges and successes of planning in Galveston provide a number of lessons for recovery planning practice:

- To seize the window of opportunity (community engagement and availability of federal recovery funds) a strong planning process is needed which also brings influential stakeholders to the table and creates meaningful deliberations.
- Bring a proactive approach to recovery planning.
- Federal recovery policy should encourage localities to inclusively plan in advance for seizing the post-disaster opportunities for the interest of community rather than passively react to the conflicts that emerge after the fact.
- It is more feasible to establish inclusive and meaningful deliberative planning processes which give a voice to different and competing interests before a catastrophic event rather than afterwards.
- Federal recovery policy should encourage long-term collaboration among policy-makers before the event, to realize the existing and predict the potential issues in a disaster situation and build consensus around those issues.
- Establish and strengthen a network of planners with neighboring communities
- Obtain community input and buy-in for a strong recovery vision before disasters
- Form collaborative processes before the disaster and maintain them in the aftermath
- Federal recovery policy should emphasize a distinction between planning for short-term and long-term recovery, as well as between frameworks for emergency management and recovery management

For research

Further research should ask the following questions about recovery planning to further inform our knowledge of the opportunities and challenges in disaster recovery planning:

- Case studies from communities that undertook recovery planning since 2011 based on NDRF principals should examine whether or not recovery planning process have improved in practice with the new NDRF? And How? Comparative case studies of the planning process, especially with the new NDRF that has a new approach from ESF#14 LTCR program can inform policy makers of its value since several of the issues in Galveston were related to the LTCR approach to planning.
- Comparative case studies should inquire: What are the common elements of recovery planning micro-processes among those communities that succeed in recovery and enhance resilience? This should be based on linking recovery planning process with recovery outcomes.
- In-depth case studies should explore experiences of inclusion and exclusion from post-disaster recovery planning among socially vulnerable populations. This will provide insights to design inclusive planning processes and also to empower socially vulnerable populations through the opportunity of disaster recovery planning.

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APPENDIX 1

Code families and codes used for reviewing literature, Atlas.ti output

Code Family	Code
FEDERAL RECOVERY POLICY	federal policy_critique: dependence
	federal policy_critique: prescriptive
	federal policy_critique: reactive
	federal policy-critiques: short time span
PLANNING THEORY	planning theories-indusive
	PLANNING THEORY_collaborative
	PLANNING THEORY_polotical influence
	PLANNING THEORY_social movement
	PLANNING THEORY_technical beureucratic
POST-DISASTER SITUATION	post-disaster situation_need for planning
	post-disaster situation_Dillema: challenge for planning
	post-disaster situation_other challenges for planning
	post-disaster situation_Opportunity: advantages for planning
	post-disaster situation_considerations for planning
RECOVERY PLAN	recovery plan_ dimensions
	recovery plan_ information
	recovery plan_ mitigation
	recovery plan_ special regulations
	recovery plan_ troubling
	recovery plan_agreements
	recovery plan_allow public input
	recovery plan_clear priorities
	recovery plan_committment
	recovery plan_consistent
	recovery plan_direction
	recovery plan_flexible
	recovery plan_implementation
	recovery plan_importance
	recovery plan_needs
	recovery plan_resources
	recovery plan_sustainability
	recovery plan_vision
	recovery plan-land use
RECOVERY PLANNING	recovery planning process: adaptive/learning

Code Family	Code
PROCESS	recovery planning process: address conflicts
	recovery planning process: build capacity
	recovery planning process: collaboration-cooperation
	recovery planning process: data
	recovery planning process: deliberation
	recovery planning process: diversity
	recovery planning process: inclusive
	recovery planning process: integrate vulnerability
	recovery planning process: leadership
	recovery planning process: local
	recovery planning process: multiobjective
	recovery planning process: proactive
	recovery planning process_ long-term
	recovery planning process_partnership

APPENDIX 2

Code-primary document family table, Atlas.ti output

Codes / Primary Document Families	FEMA	NDRF critiques	plan quality	planning theories	post-disaster	Recovery studies	TOTALS
federal policy_critique: dependence	0	0	0	0	0	0	8
federal policy_critique: prescriptive	1	0	0	0	6	0	19
federal policy_critique: reactive	0	0	0	0	0	2	23
federal policy-critiques: short time span	0	0	0	0	0	1	6
planning theories	0	0	0	2	0	0	2
planning theories-inclusive	2	0	0	1	0	0	3
PLANNING THEORY_ collaborative	1	0	0	0	0	0	2
PLANNING THEORY_social movement	0	0	0	0	0	0	2
PLANNING THEORY_technical beureucratic	0	0	0	0	0	0	3
post-disaster situation_advantages for planning	1	0	0	0	0	0	1
post-disaster situation_challenges for planning	0	0	0	0	0	0	11
post-disaster situation_considerations for planning	0	0	1	0	11	0	29
post-disaster situation_Dillema: challenge for planning	1	0	0	0	6	1	15
post-disaster situation_need for planning	5	0	0	0	6	1	13

Codes / Primary Document Families	FEMA	NDRF critiques	plan quality	planning theories	post-disaster	Recovery studies	TOTALS
post-disaster situation _Opportunity: advantages for planning	2	0	0	0	0	0	9
recovery plan_ dimensions	2	0	1	0	2	1	8
recovery plan_ information	1	0	0	0	2	0	11
recovery plan_ mitigation	7	0	0	0	0	0	7
recovery plan_ special regulations	0	0	0	1	2	0	3
recovery plan_ troubling	0	0	0	0	8	0	8
recovery plan_agreements	1	0	0	0	5	0	15
recovery plan_clear priorities	1	0	0	0	0	1	2
recovery plan_committment	1	0	0	0	1	1	3
recovery plan_consistent	7	0	0	0	0	0	7
recovery plan_direction	3	0	0	0	1	1	5
recovery plan_flexible	1	0	0	0	5	0	9
recovery plan_ implementation	5	0	0	1	0	1	7
recovery plan_importance	0	0	3	0	0	0	3
recovery plan_needs	0	0	0	0	1	1	4
recovery plan_resources	0	0	0	0	3	1	12
recovery plan_sustainability	2	0	0	0	0	2	4
recovery plan_vision	6	0	1	0	4	0	17
recovery plan-land use	2	0	0	0	0	0	2
recovery planning process: adaptive/learning	1	0	0	0	4	1	13
recovery planning process: address conflicts	5	0	0	1	0	0	26

Codes / Primary Document Families	FEMA	NDRF critiques	plan quality	planning theories	post-disaster	Recovery studies	TOTALS
recovery planning process: build capacity	0	0	0	0	4	2	23
recovery planning process: collaboration-cooperation	15	0	0	1	3	1	59
recovery planning process: data	6	0	0	0	0	0	6
recovery planning process: deliberation	0	0	0	0	1	0	5
recovery planning process: diversity	3	0	0	1	0	0	6
recovery planning process: inclusive	7	0	0	0	6	3	34
recovery planning process: integrate vulnerability	3	0	0	1	4	2	10
recovery planning process: leadership	6	0	0	0	1	0	7
recovery planning process: local	4	0	0	0	8	1	49
recovery planning process: multiobjective	5	0	0	0	0	0	5
recovery planning process: proactive	7	0	0	0	0	2	44
recovery planning process_ long-term	9	0	0	0	5	0	21
recovery planning process_partnership	2	0	0	0	0	0	2
recovery planning process_steps	4	0	0	0	0	0	4
recovery planning_good process	1	0	0	0	0	0	7
rehabilitative functions	7	0	0	0	0	0	7
TOTALS:	137	1	6	9	99	30	620

APPENDIX 3

Interview Guide

This set of questions is designed to be open-ended and give the opportunity to informants to express their information and viewpoints without being restricted by the interviewer.
Answers they provide to this question would probably yield interesting and important insights that need to be more zoomed into with structured questions.
I first introduce myself and explain our study objectives and why I needed to talk to the interviewee as an important informant to our research.
I will use the following questions as a list of issues and topics to cover in the interview.
Some new issues might be added during the interview based on the interesting issues the informant talks about but the intention is to make sure all the present questions are covered.

General Topic: Hurricane Impact

- I would like to begin, but just spending a little time talking about hurricane Ike and its impact on Galveston Island, the city, and its people…In general, how would you characterize Hurricane Ike's impact on Galveston? What kinds of things were hit hardest?
- What kinds of things were least impacted? Can you describe how Galveston looked like after Hurricane Ike? Where was most severely damaged? Where was least severely damaged?
- Do you think that Galveston is back to normal or back to the way things were before the storm? IF THINGS HAVE RETURNED TO NORMAL: how long did it take? IF NOT: Are some things back to normal? What are these things? What things are not yet back to normal? What were the major areas of problems that had to be dealt with urgently? How long did it take for the Island to return to normal daily life?

By this question I want to see how people from different positions assess the immediate post disaster situation which can affect their assessment of the recovery whether to normal predisaster situation or to a relatively better situation. I can also find whether my informants have faith and hope in the future for Galveston Island as a vulnerable coastal community. This would significantly affect their viewpoint about recovery.

General Topic: Ike Recovery Experience in General

- Now, let's shift gears a bit, and focus on the recovery. What do you see as some of th major successes in the recovery efforts? What did seem to go well in recovery and what things did not seem to be going very well? What kinds of things went well for families and households? What are some of the

shortcomings or problems? What were some of the issues that people had the greatest problems with getting accomplished? Can you tell me what the experience of recovery after hurricane Ike is like in general?

I want the informant to talk about their general picture of what is done and who is involved in disaster recovery in Galveston. Starting with such a general descriptive question I want to give the informant the opportunity to express their thoughts and feelings without being limited by my specific question. This question should be asked from those who had/have responsibilities regarding recovery including officials and nonofficial and also those who were/are affected by recovery like citizens and those who monitored and criticized I like journalists, state and federal authorities.

General Topic: Informants Role in Ike Recovery (recovery process vs. recovery planning process)

- Thinking about many activities undertaken to bring Galveston back after Ike, what kind of activities were you involved in? How do you characterize your role in recovery after Ike? Were you involved in the recovery planning specifically?

I want to first verify my informants' role in recovery process and then ask them to evaluate the planning process and recovery process based on the role they had

Special Topic: evaluation of recovery planning process and outcome from the viewpoint of those who were involved in it

- If you took part in the planning process how did you get involved in the planning process and what was your role in the planning process? How do you think did the outcome of planning inform the actions in the recovery process? How do you evaluate the contribution of recovery planning in Galveston Recovery Practice? How do you think planning helped to reach a better and quicker recovery? Why do you think the role of planning was this way? What would you change about recovery planning now based on the lessons you learned through recovery planning in Galveston?

Special Topic: evaluation of recovery planning committee work from the viewpoint of members and chair

- *For recovery committee members*: Now let's talk about your involvement in the recovery planning committee. First of all, in general terms, can you describe to me how the recovery planning process was carried out in Galveston after Ike from your perspective? What were the major goals? Which agencies and who were involved? What steps or stages were taken? Was there any assistance from outside provided for recovery planning? Was it helpful? Do you think the process has been successful? Were all or some of the goals reached (which ones were and were not)?
- Can you describe the mission and accomplishments of the Galveston Recovery Committee? What was the agenda of a typical meeting of the recovery committee? How often did the committee met? How many times did you meet? How long was a typical meeting? Can you remember when your first and last

meeting was? Where did you usually used to meet? How many people attended usually? Where did each person usually seat (if they used to seat in fixed seats)? What did they talk about in the meetings? Can you remember specific issues and interests raised by particular members in the committee or people who attended committee meetings? Did you always have a specific agenda for your meetings? Can you remember particular members who were most assertive or influential in the meetings? Can you describe some of the committee members?

- (committee chair) Can you tell me about your experience as the committee chair/member? How did you get elected/appointed? What were your responsibilities? How long did you serve as the chair or committee member? What was your primary profession at the time? Did you have any similar experience with disaster recovery or other community planning activities? What challenges and problems did you face during the recovery planning in the committee? What did you like and dislike about this position and job? What did you learn through this experience? How did this experience change your views about Galveston community, local and federal administration, etc.?

Special Topic: evaluation of inclusiveness of recovery planning process from the viewpoint of those who were involved in it

- Were you able to get any of your concerns or ideas on the agenda for recovery planning? Do you think a wide or narrow range of Galvestonians were represented on the recovery planning committee? What kinds of strategies were applied when there was a conflict on specific issues or decisions? Can you describe in more detail some of those conflicting situations? Is there anything that you think could be done in a different way to reach a better recovery plan? Can you explain to me what are those things and how do you suggest the committee would had better approach those issues? What do you see as the strengths and weaknesses or shortcomings of this process?
- How did public have access to recovery planning committee? Did people show any interest in what recovery committee was doing? Were there any cases when citizens tried to change decisions made by recovery committee or other authorities about Galveston recovery that they were not happy with? Can you explain in detail some of those situations? How were these situations dealt with? Do you think those claims were legitimate?

Special Topic: evaluation of recovery planning process and outcome from the viewpoint of those who were involved in it and had other roles in Galveston community recovery

- How do you think did the outcome of planning inform the actions in the recovery process? How do you evaluate the contribution of recovery planning in Galveston Recovery Practice? How do you think planning helped to reach a better and quicker recovery? Why do you think the role of planning was this way? What would suggest to change about recovery planning now based on the lessons you learned through recovery practice in Galveston?

Special Topic: evaluation of housing recovery from the viewpoint of those who were involved either in recovery planning or recovery process specifically regarding housing

- What did you see as the major problems people had in rebuilding or repairing their homes? What were the major resources (private and public) that were available to homeowners? What kind of issues were homeowners facing? What problems are people still having?
- What about rental housing? Were things different for the owners of rental housing and for multifamily/apartment owners?
- Where are the major successes and failures in rebuilding occurring? What might be done to address the problems?

This question should be asked from the housing recovery program managers (former and current) and the homeowners who applied for assistance. This will reveal if they have different (mis)understandings about the process and how they assess the situation regarding housing recovery assistance and the problems each group might have encountered.

APPENDIX 4

Code Categories and codes, Atlas.ti output

Categories and codes	Interview	LTRC FEMA handouts	LTRC Memo	LTRC Plan	Media Texas	Studies	TOTALS
*EVAL_EVALUATION Negative	80	0	0	3	4	6	93
*EVAL_EVALUATION neutral	0	0	0	0	0	0	0
*EVAL_EVALUATION Poisitive	71	0	3	2	0	0	76
*EVALUATION	0	0	0	0	0	0	0
BUSINESS RECOVERY	0	0	0	0	0	0	0
busn recovery_assistance	34	0	0	0	0	0	34
busn recovery_importance resilience	19	0	0	0	0	0	19
busn recovery_neglect	8	0	0	0	0	0	8
busn recovery_success	51	0	0	1	0	0	52
busn recovery-challenge	13	0	0	2	0	0	15
CHANGE	0	0	0	0	0	0	0
Change_ vacation rentals	4	0	0	0	0	0	4
Change_officials	28	0	0	0	0	0	28
change-new residents	8	0	0	0	0	0	8
CONTEXT	0	0	0	0	0	0	0
context_appealing	2	0	0	0	0	0	2
context_bankrupted city	7	0	0	0	0	0	7
context_concurrent events with Ike	29	0	0	0	0	0	29
Context_exposure	0	0	0	2	0	0	2
Context_impact overshadowed	3	0	0	0	0	0	3
context_old	16	0	0	3	0	0	19
context_poor population	16	0	0	2	0	1	19
context_sense of community	2	0	0	0	0	0	2
ECONOMY	0	0	0	0	0	0	0
economy_development	56	0	0	1	0	0	57
economy_recovery	32	0	0	1	0	0	33
Economy_tourism	1	0	0	0	0	0	1
HOUSING PROGRAM	0	0	0	0	0	0	0

Categories and codes	Interview	LTRC FEMA handouts	LTRC Memo	LTRC Plan	Media Texas	Studies	TOTALS
housing program rules	74	0	0	0	0	0	74
housing program_ CDM	67	0	0	0	0	0	67
housing program_ government agencies	99	0	0	0	0	0	99
housing program_ objective	58	0	0	2	1	1	62
housing program_ slow	123	0	0	0	0	0	123
housing program_case managers	8	0	0	0	0	0	8
housing program_contractors	31	0	0	0	0	0	31
housing program_DOB	36	0	0	0	0	0	36
housing program_overwhelming for city	1	0	0	0	0	0	1
housing program-transition, URS inventory	17	0	0	0	0	0	17
IMPACT	0	0	0	0	0	0	0
Impact_ population loss	65	0	0	1	0	0	66
Impact_damage	93	0	0	16	0	0	109
Impact_displacement	2	0	0	0	0	0	2
impact_long term back to normal fight	2	0	0	0	0	0	2
Impact_long term forgotten	2	0	0	0	0	0	2
impact_opportunity	63	0	0	4	0	0	67
impact_psychological	58	0	0	0	0	0	58
impact-cohesion	24	0	0	0	1	2	27
Impact-Economy	0	0	0	2	0	0	2
Impact-surprise	5	0	0	0	0	0	5
INFRASTRUCTURE	0	0	0	0	0	0	0
infrastructure recovery	66	0	0	32	0	0	98
INSURANCE	0	0	0	0	0	0	0
insurance_issues	32	0	0	3	0	0	35
Insurance_underinsured	1	0	0	3	0	0	4
insurance_waits	18	0	0	0	0	0	18
LEARNING RECOVERY PLANNING	0	0	0	0	0	0	0
learning recovery planning_challenge	71	0	0	0	0	0	71
learning recovery planning_future disasters	85	0	0	0	0	0	85

Categories and codes	Interview	LTRC FEMA handouts	LTRC Memo	LTRC Plan	Media Texas	Studies	TOTALS
learning recovery planning_priorities	35	0	0	7	1	0	43
learning recovery planning_vision	30	3	0	4	1	0	38
LTRC	0	0	0	0	0	0	0
LTRC_ involvement	189	0	3	14	5	7	218
LTRC_Committment	3	3	6	4	2	5	23
LTRC_Disagreements	31	2	0	6	11	8	58
LTRC_disconnect	12	0	0	8	0	0	20
LTRC_ESF14 top-down	9	2	1	4	0	2	18
LTRC_feasibility	7	0	0	6	0	1	14
LTRC_Galveston Style	10	0	1	2	0	3	16
LTRC_impact	76	0	0	6	7	1	90
LTRC_implementation	22	0	0	22	5	1	50
LTRC_inclusive	5	0	0	15	4	4	28
LTRC_no consensus building	28	1	0	3	1	0	33
LTRC_plan	135	1	3	26	12	10	187
LTRC_planners	5	0	0	0	0	0	5
LTRC_procedure	89	0	1	17	1	3	111
LTRC_public input	0	2	1	15	3	3	24
LTRC_raised expectations	1	0	0	3	0	1	5
LTRC_support plan	0	0	0	0	13	9	22
LTRC_technical assistance	28	1	6	6	0	1	42
LTRC_time	34	0	0	5	0	0	39
LTRC_Transparency	7	2	1	5	0	2	17
LTRC-alternative	2	0	0	0	0	0	2
LTRC-initiation	19	0	0	5	0	0	24
LTRC-organization	10	0	0	3	0	1	14
LTRC-Ranking	1	1	0	54	0	2	58
MITIGATION	0	0	0	0	0	0	0
mitigation_tools	26	0	0	28	2	1	57
MIXED INCOME	0	0	0	0	0	0	0
mixed income_objection rationale	28	0	0	0	0	0	28
mixed income_support rationale	46	0	0	0	0	0	46
PLANNING DEPARTMENT	0	0	0	0	0	0	0
planning department_ permitting	2	0	0	0	0	0	2

Categories and codes	Interview	LTRC FEMA handouts	LTRC Memo	LTRC Plan	Media Texas	Studies	TOTALS
planning department_comprehensive plan	3	0	0	0	0	1	4
Planning department_parallel	5	0	0	0	0	0	5
Pre_Ike Issues_ infrastructure	0	0	0	1	0	0	1
PRE-IKE ISSUES	0	0	0	0	0	0	0
pre-Ike Issues_decent rentals	1	0	0	0	0	0	1
pre-Ike Issues_old city-old codes	4	0	0	0	0	0	4
pre-Ike Issues_population loss_consequences	30	0	0	0	0	0	30
pre-Ike Issues_population loss_reason	78	0	0	0	0	1	79
pre-Ike Issues_schools improving	6	0	0	1	0	0	7
pre-Ike Issues_vacant housing	11	0	0	2	0	3	16
PUBLIC HOUSING	0	0	0	0	0	0	0
public housing debate_importance, consequence	111	0	0	5	0	0	116
public housing_advocacy	19	0	0	0	0	0	19
public housing_decisions	89	0	0	0	0	0	89
public housing_GHA	12	0	0	1	0	0	13
public housing_objections rationale	143	0	0	0	0	2	145
public housing_plans solutions	117	0	0	0	0	0	117
public housing_right of return	12	0	0	0	0	0	12
public housing_stakeholders	22	0	0	0	0	0	22
public housing-GLO mediator	6	0	0	0	0	0	6
public housing-support rationale	82	0	0	0	0	1	83
RECOVERY	0	0	0	0	0	0	0
Recovery_ differential	33	0	0	0	0	0	33
recovery_ marginalized	36	0	0	1	0	0	37
recovery_challenges from federal agencies	25	0	0	0	0	1	26
recovery_effect of resilience	15	0	0	4	0	1	20

Categories and codes	Interview	LTRC FEMA handouts	LTRC Memo	LTRC Plan	Media Texas	Studies	TOTALS
recovery_effect of vulnerability	75	0	0	1	0	1	77
recovery_frustration from unknowns	4	0	0	0	0	1	5
Recovery_funds	33	0	0	11	2	1	47
recovery_historic preservation	10	0	0	0	0	0	10
Recovery_preparations	62	0	0	0	0	0	62
recovery_progress	68	0	0	1	0	1	70
recovery_role of external organizations	1	0	0	0	0	0	1
Recovery_role of leadership	0	0	0	2	1	1	4
Recovery_role of local government	65	0	0	8	14	10	97
Recovery_role of organizations	51	0	0	0	1	0	52
Recovery_temporary housing	22	0	0	0	0	0	22
recovery_top down management	5	0	0	0	0	0	5
Recovery-compared to NOLA	6	0	0	0	0	0	6
recovery-Needs	7	0	0	0	0	0	7
RESPONSE	0	0	0	0	0	0	0
response_challenge	31	0	0	1	0	0	32
response_experienced by Ike	4	0	0	0	0	0	4
response_success	33	0	0	0	0	0	33
TOTALS:	3808	18	26	387	92	100	4431

APPENDIX 5

Research question memo, Atlas.ti output

Memos

HU: Galveston Recovery
File: [C:\Users\sara\Desktop\Galveston Recovery.hpr7]
Edited by: Super
Date/Time: 2015-05-27 16:20:27

MEMO: Research question 1.1.initiation of LTRC (0 Quotations) (Super, 2015-05-01 19:37:33)
No codes
No memos
Type: Theory
RQ1: How was recovery planning undertaken in Galveston?
RQ1.1. How did the planning process started? How is the initiation approach evaluated?
Review all the quotations for code LTRC_ initiation: then a cooccurance of initiation and evaluation
Negative
I have 11 quotations but only 3 of them didn't contain any evaluation of the time and the way LTRC was initiated
Quote 3:94, 3:251 and 33:1 and 34:23 these quotes talk about council starting the ESF14 process and making the comprehensive plan committee the core of LTRC and keep adding members for 6 weeks to reach 330 members

Query: ("*EVAL_EVALUATION Negative" COOCCUR "LTRC-initiation")

There were a lot of eyebrows raised, and sly smiles, and as I told the Committee in late March, people rooting for us, but betting against us.

There were a lot of eyebrows raised, and sly smiles, and as I told the Committee in late March, people rooting for us, but betting against us.
Betty: I think we began to get mired in politics in the late October, early November of 2008 we had a tug of war between the mayor and the city council about who is going to appoint a long term recovery committee to do any kind of planning on behalf of the city the mayor had made an appointment of the chairman and she
had council members were saying that you don't have the right to do that and so she resented this guy`s appointment
Betty: literally unbenounced to me, at the time of the storm I chaired the comprehensive plan committee and at a council meeting in November they appointed the comprehensive plan committee as the long term recovery committee. I got a phone call, I remember I was grocery shopping and a friend called saying that you might want to turn on the television, I think they just appointed you chair of the recovery committee. I said I don't know. That is really bad, I mean that is a bad plan, you don't even ask the chair, you don't ask the person or the people , nobody talked to anybody on the comprehensive plan committee and they just appointed us

My interpretation
Only the very last quote from Betty is negatively evaluating the initiation approach which was top-down by the City Council. The Chairperson criticized the initiation but after accepting the position she had no control on the rest of the initiation process which later had a significant impact on the credibility and impact of the LTRC plan.